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FCC UNII REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:
June 28, 2022

Test Site/Location:
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA

Report No.: HCT-RF-2206-FC012-R1

FCC ID:	**A3LSMG990B2**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**
Model:	SM-G990B2/DS
Additional Model:	SM-G990B2
EUT Type:	Mobile Phone
Modulation type	OFDM
FCC Classification:	Unlicensed National Information Infrastructure(NII)
FCC Rule Part(s):	Part 15.407

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

REVIEWED BY

Report prepared by : Chang Hee Hwang
Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee
Manager of Telecommunication Testing Center

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2206-FC012	June 17, 2022	- First Approval Report
HCT-RF-2206-FC012-R1	June 28, 2022	- Added the Frequency Stability test results

Table of Contents

1. GENERAL INFORMATION

EUT DESCRIPTION

Model	SM-G990B2/DS	
Additional Model	SM-G990B2	
EUT Type	Mobile Phone	
Power Supply	DC 4.20 V	
Modulation Type	OFDM : 802.11a, 802.11n, 802.11ac	
Frequency Range (MHz)	U-NII-1	20 MHz BW : 5180 - 5240 40 MHz BW : 5190 - 5230 80 MHz BW : 5210
	U-NII-2A	20 MHz BW : 5260 - 5320 40 MHz BW : 5270 - 5310 80 MHz BW : 5290
	U-NII-2C	20 MHz BW : 5500 - 5720 40 MHz BW : 5510 - 5710 80 MHz BW : 5530 – 5690
	U-NII-3	20 MHz BW : 5745 - 5825 40 MHz BW : 5755 - 5795 80 MHz BW : 5775
Straddle channel	Supported	
TDWR Band	Supported	
Dynamic Frequency Selection	Slave without radar detection	
Date(s) of Tests	May 26, 2022 ~ June 17, 2022	
Serial number	Radiated : R3CT40C5N7L Conducted : 6384e630d0197ece	

ANTENNA CONFIGURATIONS

1. Antenna configuration

Configurations	SISO		MIMO	
	Ant.1	Ant.2	SDM	CDD
802.11a	X	X	O	X
802.11n	X	X	O	O
802.11ac	X	X	O	O

Note:

(1) O = Support, X = Not Support

(2) SISO = Single Input Single Output

(3) SDM = Spatial Diversity Multiplexing

(4) CDD = Cyclic Delay Diversity

(5) SISO test was performed for the MIMO test result.

2.This device supports simultaneous transmission operation, which allows for two channels to operate independent of one another in the 2.4 GHz, 5 GHz bands simultaneously on each antenna.

RSDB Scenario	Bluetooth Ant.1	2.4 GHz WiFi Ant.1	2.4 GHz WiFi Ant.2	5GHz WiFi Ant.1	5GHz WiFi Ant.2
Bluetooth + 2.4 GHz WiFi + 5GHz WiFi MIMO	On	-	On	On	On
2.4 GHz WiFi MIMO + 5GHz WiFi MIMO	-	On	On	On	On

DBS	5GHz WiFi Ant.1	5GHz WiFi Ant.2	Bluetooth Ant.1
5GHz WiFi MIMO + Bluetooth	On	On	On

3. Directional Gain Calculation

According to KDB 662911 D01 Multiple Transmitter Output v02r01 F) 2) f) (ii)

Directional gain =

$$\bullet \quad DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

Band	Ant Gain (dBi)		N_{ANT}/ N_{ss}	Directional Gain (dBi)
UNII 1	ANT.1	-1.8	2 / 2	-0.64
	ANT.2	-6		
UNII 2A	ANT.1	-1.8	2 / 2	-0.64
	ANT.2	-6		
UNII 2C	ANT.1	-2.1	2 / 2	-0.74
	ANT.2	-5.8		
UNII 3	ANT.1	-1.9	2 / 2	-0.38
	ANT.2	-5.2		

Note

According to Ansi C63.10-2013 section 14.4.3, the directional gain is calculated using the formula, where GN is the gain of the nth antenna and NANT is the total number of antennas used.

Directional Gain = $10 \cdot \log(((10^{(ANT1\ Gain/20)}+10^{(ANT2\ Gain/20)})^2)/2)$ dBi

Sample MIMO Calculation:

Ex) Ant 1 : 11.58 dBm Ant 2 : 12.08 dBm

Ant1 + Ant 2 = MIMO

(11.58 dBm + 12.08 dBm) = (14.387 mW + 16.143 mW) = 30.53 mW = 14.88 dBm

2. MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted average output power as follows:

Band	Mode	Ant.1 Power		Ant.2 Power		MIMO Ant.1 + Ant.2 Power	
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)
UNII1	802.11a	14.69	0.029	14.50	0.028	17.57	0.057
	802.11n (HT20)	14.47	0.028	14.46	0.028	17.45	0.056
	802.11n (HT40)	15.01	0.032	15.16	0.033	18.10	0.065
	802.11ac (VHT20)	15.18	0.033	15.33	0.034	18.26	0.067
	802.11ac (VHT40)	14.32	0.027	14.18	0.026	17.26	0.053
	802.11ac (VHT80)	13.74	0.024	13.51	0.022	16.63	0.046
UNII2A	802.11a	15.05	0.032	15.69	0.037	18.36	0.069
	802.11n (HT20)	14.88	0.031	15.54	0.036	18.21	0.066
	802.11n (HT40)	15.20	0.033	16.23	0.042	18.69	0.074
	802.11ac (VHT20)	14.88	0.031	15.51	0.036	18.22	0.066
	802.11ac (VHT40)	14.72	0.030	15.33	0.034	18.04	0.064
	802.11ac (VHT80)	13.85	0.024	13.79	0.024	16.83	0.048
UNII2C	802.11a	15.66	0.037	15.89	0.039	18.79	0.076
	802.11n (HT20)	15.47	0.035	15.70	0.037	18.60	0.072
	802.11n (HT40)	16.05	0.040	16.39	0.044	19.24	0.084
	802.11ac (VHT20)	15.43	0.035	15.69	0.037	18.57	0.072
	802.11ac (VHT40)	15.42	0.035	15.62	0.037	18.53	0.071
	802.11ac (VHT80)	13.81	0.024	14.11	0.026	16.97	0.050
UNII3	802.11a	10.83	0.012	10.58	0.011	13.38	0.022
	802.11n (HT20)	10.62	0.012	10.68	0.012	13.66	0.023
	802.11n (HT40)	10.43	0.011	10.71	0.012	13.48	0.022
	802.11ac (VHT20)	10.61	0.012	10.97	0.012	13.64	0.023
	802.11ac (VHT40)	10.42	0.011	10.60	0.011	13.52	0.022
	802.11ac (VHT80)	9.05	0.008	9.71	0.009	12.40	0.017

3. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 dated December 14, 2017 entitled “Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part15, Subpart E” and ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’ were used in the measurement.

EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E.

GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1 GHz. Above 1 GHz with 1.5 m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013)

DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.
Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.
Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.
Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203, §15.407:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

(1) The antennas of this E.U.T are permanently attached.

(2) The E.U.T Complies with the requirement of §15.203, §15.407

7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

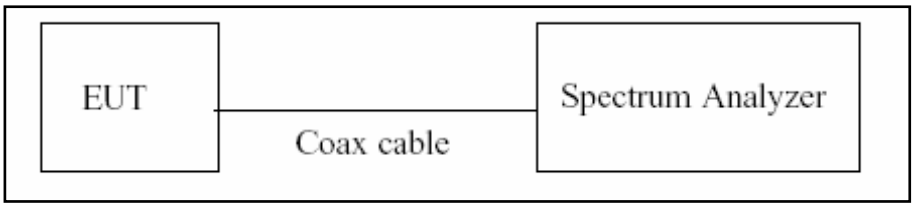
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	2.00 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.40 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.74 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.51 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.92 (Confidence level about 95 %, k=2)
Radiated Disturbance (Above 40 GHz)	5.48 (Confidence level about 95 %, k=2)

8. DESCRIPTION OF TESTS

8.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure B.2 in KDB 789033 D02 v02r01.

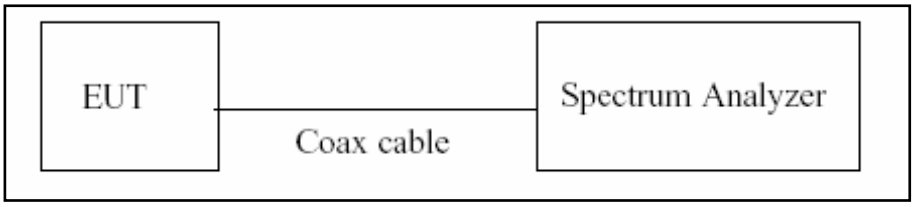
1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

8.2. 6 dB Bandwidth & 26 dB Bandwidth

Limit

Within the 5.725-5.85 GHz(NII-3), the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

Test Configuration



Test Procedure(26 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure C.1 in KDB 789033 D02 v02r01.

1. RBW = approximately 1 % of the emission bandwidth
2. VBW > RBW
3. Detector = Peak
4. Trace mode = max hold
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1 %.

Test Procedure (6 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure C.2 in KDB 789033 D02 v02r01.

1. RBW = 100 kHz
2. VBW ≥ 3 x RBW
3. Detector = Peak
4. Trace mode = max hold
5. Allow the trace to stabilize
6. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points(upper and lower frequencies) that are attenuated by 6 dB relative to the maximum lever measured in the fundamental emission.

Note:

1. We tested X dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any channels belong to UNII1 and UNII3 band for DFS.
3. The 26 dB bandwidth is used to determine the conducted power limits.

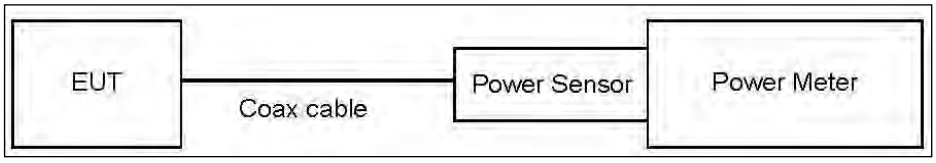
8.3. Output Power Measurement

Limit

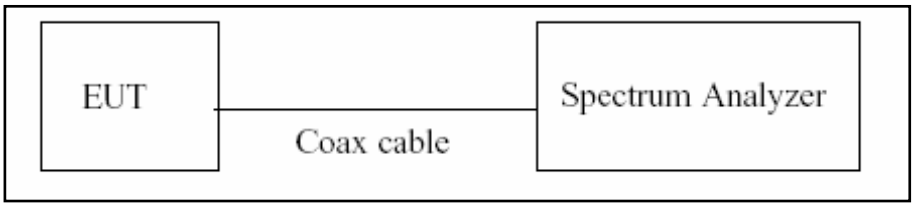
Band	Limit
UNII 1	- Master : Not exceed 1 W(=30 dBm) - Slave : Not exceed 250 mW(=23.98 dBm)
UNII 2A, 2C	Not exceed the lesser of 250 mW or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)
UNII 3	Not exceed 1 W(=30 dBm)

Test Configuration

Power Meter



Spectrum Analyzer(Only Straddle Channel)



Test Procedure(Power Meter)

We tested according to Procedure E.3.a in KDB 789033 D02 v02r01.

1. Measure the duty cycle.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Test Procedure(Spectrum Analyzer)

The transmitter output is connected to the Spectrum Analyzer.

We use the spectrum analyzer's integrated band power measurement function.

We tested according to Procedure E.2.d) in KDB 789033 D02 v02r01.

1. Measure the duty cycle.
2. Set span to encompass the 26 dB EBW of the signal.
3. RBW = 1 MHz.
4. VBW ≥ 3 MHz.
5. Number of points in sweep ≥ 2 x span/RBW.
6. Sweep time = auto.
7. Detector = RMS.
8. Do not use sweep triggering. Allow the sweep to "free run".
9. Trace average at least 100 traces in power averaging(RMS) mode
10. Integrated bandwidth = OBW
11. Add 10log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Sample Calculation

Total Power(dBm) = Measured Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

Note

1. Spectrum Measured Levels are not plot data.
   The power results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset Loss = Attenuator loss(10 dB) + Cable loss + EUT Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	11.36
UNII 2A	11.36
UNII 2C	11.36
UNII 3	11.36

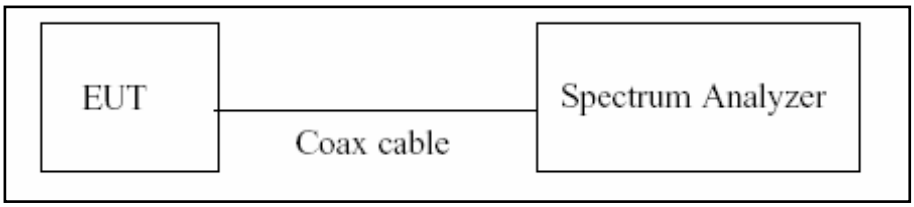
(Actual value of loss for the attenuator and cable combination)

8.4. Power Spectral Density

Limit

Band	Limit
UNII 1	11 dBm/MHz
UNII 2A, 2C	11 dBm/MHz
UNII 3	30 dBm/500 kHz

Test Configuration



Test Procedure

We tested according to Procedure F in KDB 789033 D02 v02r01.

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz(510 kHz for UNII 3)
3. VBW ≥ 3 MHz
4. Number of points in sweep ≥ 2 x span/RBW.
5. Sweep time = auto.
6. Detector = RMS(i.e., power averaging), if available. Otherwise, use sample detector mode.
7. Do not use sweep triggering. Allow the sweep to “free run”.
8. Trace average at least 100 traces in power averaging(RMS) mode
9. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
10. If Method SA-2 was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.

Sample Calculation

Total PSD(dBm) = Measured Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

Note

1. Spectrum Measured Levels are not plot data.
   The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset Loss = Attenuator loss(10 dB) + Cable loss + EUT cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	11.36
UNII 2A	11.36
UNII 2C	11.36
UNII 3	11.36

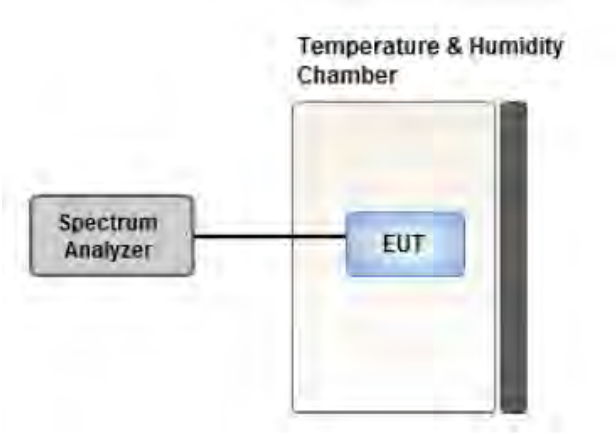
(Actual value of loss for the attenuator and cable combination)

8.5. Frequency Stability

Limit

Maintained within the band

Test Configuration



Test Procedure

1. The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between -30 ℃ and 50 ℃.
2. The temperature was incremented by 10 ℃ intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.
3. The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battety operating end point which shall be specified by the manufacturer.
4. While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

8.6. AC Power line Conducted Emissions

Limit

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56[a]	56 to 46[a]
0.50 to 5	56	46
5 to 30	60	50

[a]Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

Test Procedure

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors : Quasi Peak and Average Detector.

Sample Calculation

Quasi-peak(Final Result) = Measured Value + Correction Factor

8.7. Radiated Test

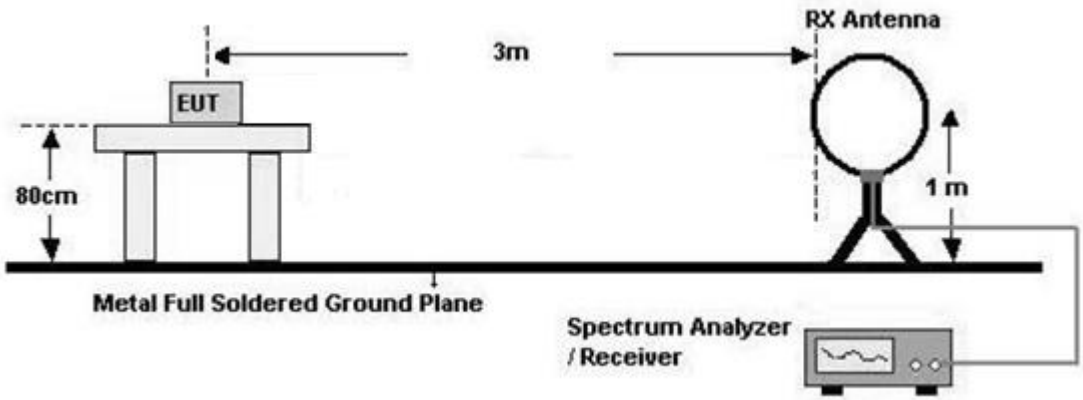
Limit

1. UNII 1: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of −27 dBm/MHz.
2. UNII 2A, 2C: All emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.
3. UNII 3: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
4. All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Section 15.209.

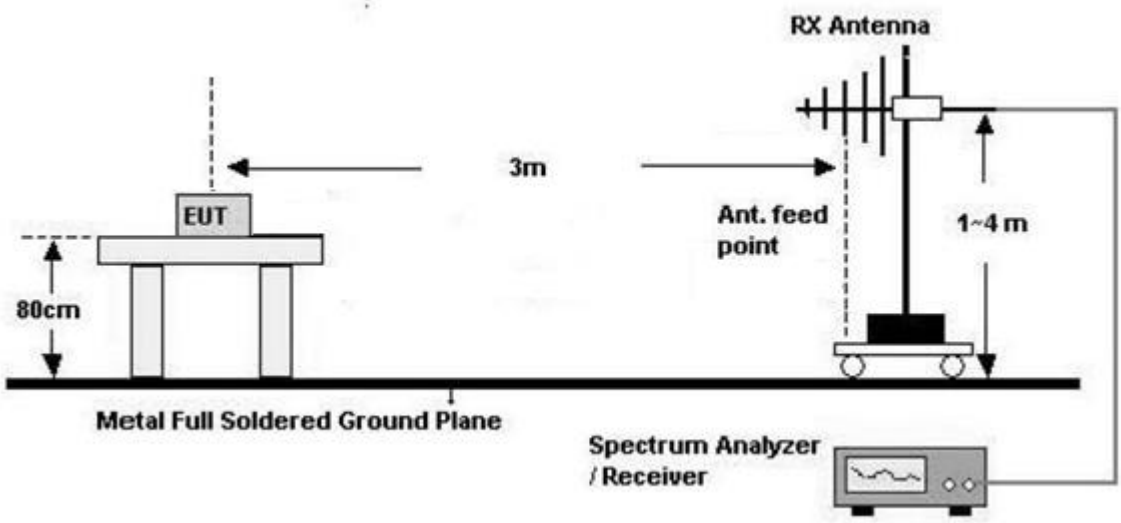
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

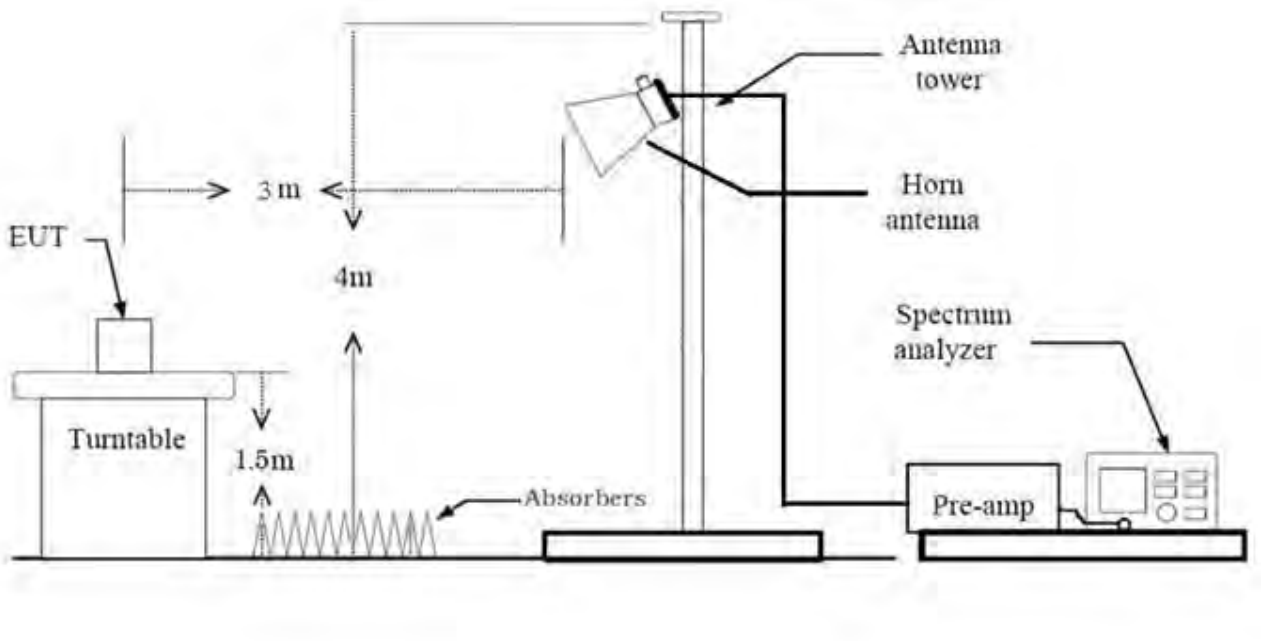
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8 m above ground plane.
4. .We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
8. Spectrum Setting
   - Frequency Range = 9 kHz ~ 30 MHz
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 9 kHz
   - VBW ≥ 3 x RBW
9. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions(Below 1 GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
   (1) Measurement Type(Peak):
      - Measured Frequency Range : 30 MHz – 1 GHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 100 kHz
      - VBW ≥ 3 x RBW
   (2) Measurement Type(Quasi-peak):
      - Measured Frequency Range : 30 MHz – 1 GHz
      - Detector = Quasi-Peak
      - RBW = 120 kHz

   ※ In general, (1) is used mainly
7. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type (Peak, G.5 in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Sweep Time = auto
- Trace mode = max hold
- Allow sweeps to continue until the trace stabilizes.

Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle.

(2) Measurement Type (Average, G.6.d in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW(Duty cycle ≥ 98 %) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 %) = VBW ≥ 1/T, where T is the minimum transmission duration.
- The analyzer is set to linear detector mode.
- Detector = Peak.
- Sweep time = auto.
- Trace mode = max hold.
- Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 % duty cycle. For lower duty cycles, increase the minimym number of traces by a factor of 1/x, where x is the duty cycle.

9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor
10. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency
11. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
12. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type(Peak, G.5 in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Sweep Time = auto
- Trace mode = max hold
- Allow sweeps to continue until the trace stabilizes.

Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle.

(2) Measurement Type(Average, G.6.d in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW(Duty cycle ≥ 98 %) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 %) = VBW ≥ 1/T, where T is the minimum transmission duration.
- The analyzer is set to linear detector mode.
- Detector = Peak.
- Sweep time = auto.
- Trace mode = max hold.
- Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 % duty cycle. For lower duty cycles, increase the minimym number of traces by a factor of 1/x, where x is the duty cycle.

9. Measured Frequency Range :
   - 4 500 MHz ~ 5 150 MHz
   - 5 350 MHz ~ 5 460 MHz
   - 5 460 MHz ~ 5 470 MHz
   - (75 MHz or more below the 5 725 MHz) ~ 5 725 MHz
   - 5 850 MHz ~ (75 MHz or more above the 5 850 MHz)
10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
11. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Attenuator(ATT) + Distance Factor(D.F)

The actual setting value of VBW

Mode	Worst Data rate (Mbps)	Duty Cycle	Duty Cycle Factor (dB)	The actual setting value of VBW (Hz)
802.11a	6	0.935	0.292	1000
802.11n(HT20)	MCS0	0.925	0.339	1000
802.11n(HT40)	MCS0	0.866	0.624	2000
802.11ac(VHT20)	MCS0	0.929	0.322	1000
802.11ac(VHT40)	MCS0	0.860	0.654	2000
802.11ac(VHT80)	MCS0	0.763	1.178	5000

8.8. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone, Stand alone + External accessories(Earphone, etc)
   - Worstcase : Stand alone
2. EUT Axis
   - Radiated Spurious Emissions : Z
   - Radiated Restricted Band Edge : X
3. All datarate of operation were investigated and the worst case datarate results are reported.
   - Mode : Ant.1+Ant.2(SDM), Ant.1+Ant.2(CDD)
   - Worstcase : Ant.1+Ant.2(CDD)
   - 802.11a : 6 Mbps
   - 802.11n_HT20 : MCS0
   - 802.11n_HT40 : MCS0
   - 802.11ac_VHT20 : MCS0
   - 802.11ac_VHT40 : MCS0
   - 802.11ac_VHT80 : MCS0
4. Radiated Spurious Emission
   - All modulation of operation were investigated and the worst case modulation results are reported.
     (Worstcase : 802.11a_6Mbps, 802.11n_HT20_ MCS0 / UNII-2A HT20 ~ VHT80)
5. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
   - Position : Horizontal, Vertical, Parallel to the ground plane
6. SM-G990B2/DS, SM-G990B2 were tested and the worst case results are reported.

(Worst case : SM-G990B2/DS)

Radiated test(DBS/RSDB)

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone, Stand alone + External accessories(Earphone, etc)
   - Worstcase : Stand alone
2. EUT Axis
   - Radiated Spurious Emissions : Z
3. This device supports simultaneous transmission operation, which allows for two channels to operate independent of one another in the 2.4 GHz, 5 GHz bands simultaneously on each antenna.

DBS	5GHz WiFi Ant.1	5GHz WiFi Ant.2	Bluetooth Ant.1	Test case
5GHz WiFi MIMO + Bluetooth	On	On	On	Case 1

Case 1: Please refer to the SM-G990B2/DS [UNII] & [BT] Test Report.

RSDB Scenario	Bluetooth Ant.1	2.4 GHz WiFi Ant.1	2.4 GHz WiFi Ant.2	5GHz WiFi Ant.1	5GHz WiFi Ant.2	Test case
Bluetooth + 2.4 GHz WiFi + 5GHz WiFi MIMO	On	-	On	On	On	-
2.4 GHz WiFi MIMO + 5GHz WiFi MIMO	-	On	On	On	On	Case 2

Case 2: Please refer to the SM-G990B2/DS [UNII] & [DTS] Test Report.

4. The following tables show the worst case configurations determined during testing.

Description	Bluetooth Emission	5 GHz Emission
Antenna	ANT1	ANT ALL
Channel	0	52
Data Rate	1 Mbps	MCS0
Mode	GFSK : DH5	802.11n(HT20)

Description	2.4 GHz Emission	5 GHz Emission
Antenna	ANT ALL	ANT ALL
Channel	6	52
Data Rate	6 Mbps	MCS0
Mode	802.11g	802.11n(HT20)

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone + External accessories(Earphone,etc) + Travel Adapter,
     Stand alone + Tr avel Adapter
   - Worstcase : Stand alone + Travel Adapter
2. SM-G990B2/DS, SM-G990B2 were tested and the worst case results are reported.

(Worst case : SM-G990B2/DS)

Conducted test

1. All datarate of operation were investigated and the worst case datarate results are reported.
2. SM-G990B2/DS, SM-G990B2 were tested and the worst case results are reported.

(Worst case : SM-G990B2/DS)

3. Frequency Stability Worst case for ANT1

9. SUMMARY OF TEST RESULTS

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26 dB Bandwidth	§15.407 (for Power Measurement)	N/A	Conducted	PASS
6 dB Bandwidth	§15.407(e)	>500 kHz (5725-5850 MHz)(UNII-3)		PASS
Maximum Conducted Output Power	§15.407(a)(1),(2),(3)	< 250 mW(5150-5250 MHz) < 250 mW or 11+10log$_{10}$ (BW) dBm (5250-5350 MHz) < 250 mW or 11+10log$_{10}$ (BW) dBm (5470-5725 MHz) <1 W (5725-5850 MHz)		PASS
Maximum EIRP Output Power	§15.407(a)(1)(3)(iii)	< EIRP 30dBm (5850-5925 MHz)		
Maximum Power Spectral Density	§15.407(a)(1),(2),(3)	<11 dBm/ MHz (5150-5250 MHz) <11 dBm/ MHz (5250-5350 MHz) <11 dBm/ MHz (5470-5725 MHz) <30 dBm/500 kHz(5725-5850 MHz)		PASS
AC Conducted Emissions 150 kHz-30 MHz	15.207 15.407(b)(9)	<FCC 15.207 limits		PASS
Frequency Stability	§15.407(g) §2.1055	Maintained within the band		PASS
Undesirable Emissions	§15.407(b) (1),(2),(3),(4)	<-27 dBm/MHz EIRP (UNII1, 2A, 2C) cf. Section 8.6 (UNII 3)	Radiated	PASS
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 15.407(b)(9),(10)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS

10. TEST RESULT

10.1 DUTY CYCLE

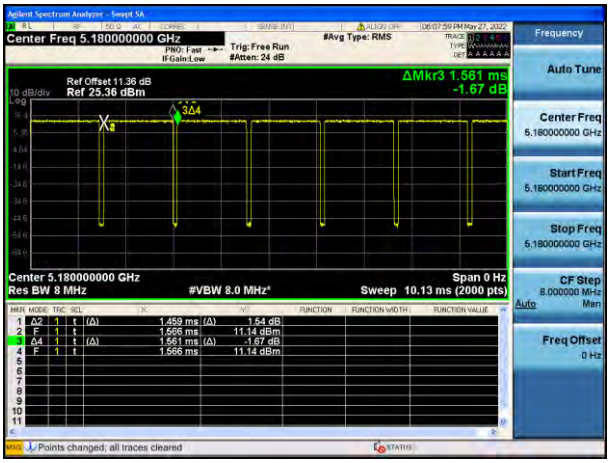
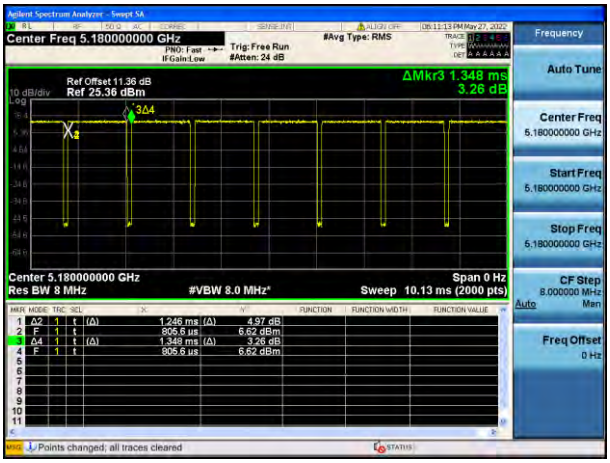
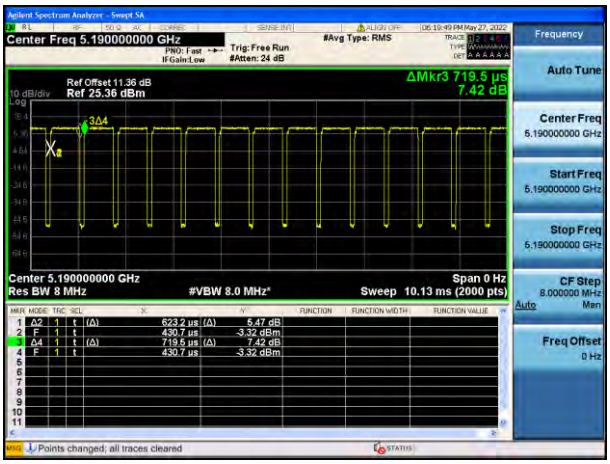
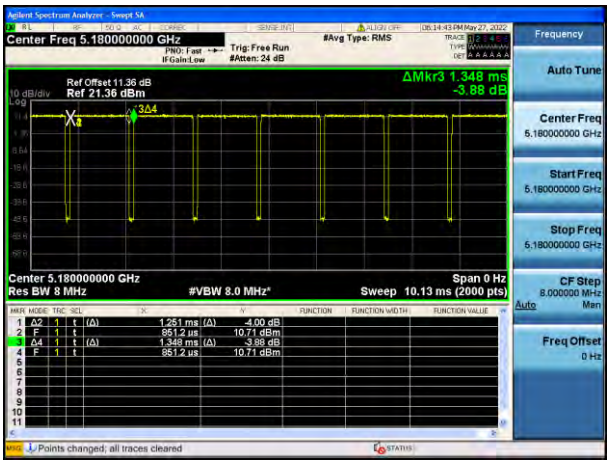
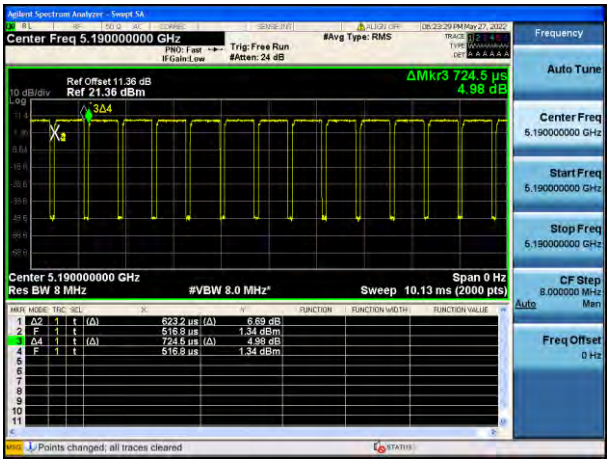
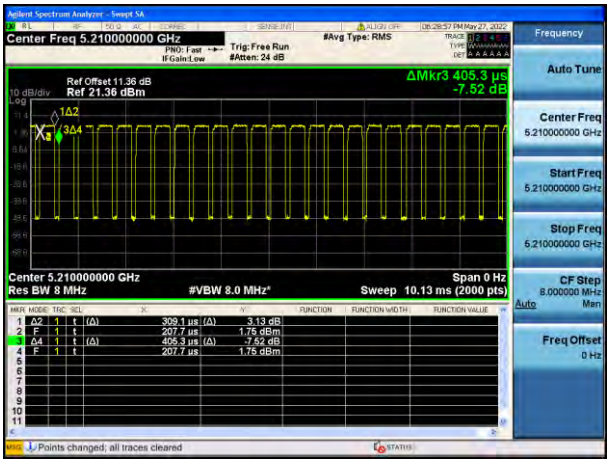
Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11a	6	1.459	1.561	0.935	0.292
	9	0.983	1.084	0.907	0.426
	12	0.740	0.841	0.880	0.558
	18	0.502	0.603	0.832	0.799
	24	0.385	0.481	0.800	0.969
	36	0.263	0.360	0.732	1.353
	48	0.203	0.329	0.615	2.109
	54	0.182	0.334	0.545	2.632

Mode	MCS Index	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11n (HT20)	0	1.246	1.348	0.925	0.339
	1	0.643	0.740	0.870	0.605
	2	0.441	0.542	0.813	0.899
	3	0.339	0.441	0.770	1.134
	4	0.238	0.339	0.701	1.540
	5	0.193	0.339	0.567	2.463
	6	0.172	0.345	0.500	3.010
	7	0.162	0.365	0.444	3.522
802.11n (HT40)	0	0.623	0.719	0.866	0.624
	1	0.329	0.426	0.774	1.114
	2	0.233	0.360	0.648	1.885
	3	0.187	0.355	0.529	2.769
	4	0.137	0.360	0.380	4.199
	5	0.111	0.345	0.324	4.901
	6	0.104	0.337	0.309	5.097
	7	0.096	0.355	0.271	5.663

Mode	MCS Index	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11ac (VHT20)	0	1.251	1.348	0.929	0.322
	1	0.649	0.745	0.871	0.601
	2	0.446	0.542	0.822	0.849
	3	0.339	0.441	0.770	1.134
	4	0.243	0.339	0.716	1.448
	5	0.193	0.334	0.576	2.398
	6	0.177	0.345	0.515	2.884
	7	0.162	0.329	0.492	3.078
	8	0.142	0.329	0.431	3.658
802.11ac (VHT40)	0	0.623	0.725	0.860	0.654
	1	0.334	0.431	0.776	1.099
	2	0.236	0.360	0.655	1.836
	3	0.187	0.345	0.544	2.643
	4	0.142	0.365	0.389	4.102
	5	0.117	0.365	0.319	4.956
	6	0.106	0.339	0.313	5.039
	7	0.096	0.339	0.284	5.473
	8	0.091	0.340	0.269	5.708
	9	0.081	0.339	0.239	6.220
802.11ac (VHT80)	0	0.309	0.405	0.763	1.178
	1	0.253	0.385	0.658	1.818
	2	0.248	0.385	0.645	1.906
	3	0.238	0.380	0.627	2.030
	4	0.193	0.377	0.510	2.921
	5	0.167	0.380	0.440	3.565
	6	0.160	0.374	0.426	3.702
	7	0.152	0.370	0.411	3.862
	8	0.147	0.360	0.408	3.889
	9	0.142	0.355	0.400	3.979

Note:

In order to simplify the report, attached plots were only lowest datarate.

802.11a	802.11n(HT20)
	
802.11n(HT40)	**802.11ac(VHT20)**
	
802.11ac(VHT40)	**802.11ac(VHT80)**
	

10.2 26 dB Bandwidth

Straddle channel data in the table below are for reporting purposes only. Straddle channel data were added in section 10.7.1.

[Ant.1]

802.11a Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	18.52	16.249
5200	40	18.53	16.267
5240	48	18.46	16.259
5260	52	18.70	16.254
5300	60	18.22	16.265
5320	64	18.51	16.262
5500	100	18.47	16.269
5600	120	18.54	16.236
5720	144	18.59	16.254
5745	149	18.52	16.257
5785	157	18.56	16.270
5825	165	18.63	16.261

802.11n(HT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	19.22	17.453
5200	40	19.66	17.462
5240	48	19.44	17.469
5260	52	19.55	17.455
5300	60	19.78	17.461
5320	64	19.40	17.434
5500	100	19.51	17.462
5600	120	19.41	17.460
5720	144	19.79	17.445
5745	149	19.72	17.449
5785	157	19.68	17.467
5825	165	19.55	17.455

802.11n(HT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	38.99	35.781
5230	46	38.75	35.769
5270	54	39.06	35.745
5310	62	39.08	35.790
5510	102	39.00	35.774
5590	118	39.02	35.764
5710	142	38.88	35.767
5755	151	39.07	35.769
5795	159	38.79	35.752

802.11ac(VHT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	19.27	17.501
5200	40	19.73	17.457
5240	48	19.50	17.446
5260	52	19.50	17.460
5300	60	19.49	17.460
5320	64	19.59	17.469
5500	100	19.35	17.442
5600	120	19.45	17.460
5720	144	19.35	17.462
5745	149	19.57	17.450
5785	157	19.55	17.452
5825	165	19.70	17.454

802.11ac(VHT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	38.87	35.769
5230	46	38.81	35.767
5270	54	39.02	35.801
5310	62	38.80	35.797
5510	102	38.92	35.779
5590	118	38.90	35.764
5710	142	38.82	35.792
5755	151	39.00	35.797
5795	159	38.90	35.776

802.11ac(VHT80) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	80.14	74.910
5290	58	80.45	74.956
5530	106	79.92	74.885
5610	122	79.95	74.954
5690	138	79.90	74.937
5775	155	80.11	74.966

[Ant.2]

802.11a Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	18.42	16.264
5200	40	18.35	16.281
5240	48	18.56	16.251
5260	52	18.58	16.279
5300	60	18.39	16.252
5320	64	18.40	16.258
5500	100	18.22	16.265
5600	120	18.52	16.259
5720	144	18.48	16.269
5745	149	18.51	16.295
5785	157	18.43	16.265
5825	165	18.11	16.251

802.11n(HT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	19.48	17.464
5200	40	19.48	17.460
5240	48	19.49	17.459
5260	52	19.44	17.466
5300	60	19.77	17.463
5320	64	19.32	17.447
5500	100	19.25	17.452
5600	120	19.59	17.448
5720	144	19.28	17.469
5745	149	19.54	17.454
5785	157	19.48	17.444
5825	165	19.61	17.456

802.11n(HT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.16	35.791
5230	46	39.00	35.754
5270	54	39.16	35.821
5310	62	38.98	35.735
5510	102	39.17	35.772
5590	118	38.75	35.757
5710	142	38.82	35.754
5755	151	38.80	35.810
5795	159	38.95	35.759

802.11ac(VHT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	19.49	17.445
5200	40	19.56	17.456
5240	48	19.69	17.465
5260	52	19.42	17.461
5300	60	19.62	17.470
5320	64	19.62	17.451
5500	100	19.64	17.456
5600	120	19.60	17.465
5720	144	19.52	17.471
5745	149	19.44	17.452
5785	157	19.72	17.459
5825	165	19.49	17.457

802.11ac(VHT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	38.82	35.752
5230	46	38.97	35.750
5270	54	38.94	35.777
5310	62	39.11	35.801
5510	102	39.04	35.753
5590	118	38.94	35.773
5710	142	38.90	35.752
5755	151	38.95	35.751
5795	159	39.00	35.752

802.11ac(VHT80) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	79.90	74.918
5290	58	79.91	74.895
5530	106	80.06	74.947
5610	122	80.04	74.916
5690	138	80.24	74.941
5775	155	80.07	74.928

[Ant.1]

▣ Test Plots(802.11a)

Note:

In order to simplify the report, attached plots were only the most wide channel.

802.11a UNII 1 BAND 26 dB Bandwidth (CH 40)	802.11a UNII 2A BAND 26 dB Bandwidth (CH 52)
	
802.11a UNII 2C BAND 26 dB Bandwidth (CH 144)	**802.11a UNII 3 BAND 26 dB Bandwidth (CH 165)**
	

▣ Test Plots(802.11n(HT20))

Note:

In order to simplify the report, attached plots were only the most wide channel.

802.11n_HT20 UNII 1 BAND 26 dB Bandwidth(CH 40)	802.11n_HT20 UNII 2A BAND 26 dB Bandwidth(CH 60)
	
802.11n_HT20 UNII 2C BAND 26 dB Bandwidth(CH 144)	**802.11n_HT20 UNII 3 BAND 26 dB Bandwidth(CH 149)**
	

▣ Test Plots(802.11n(HT40))

Note:

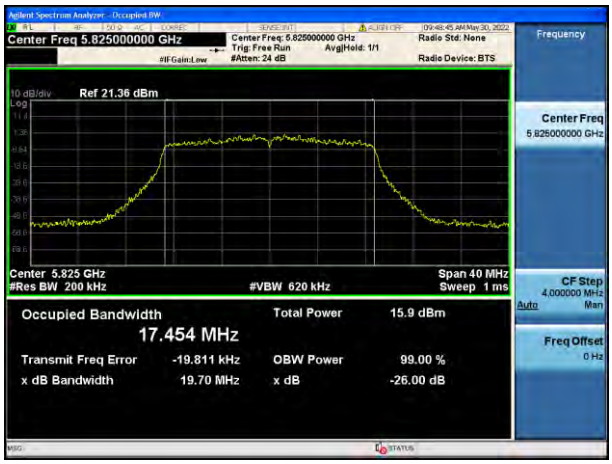
In order to simplify the report, attached plots were only the most wide channel.

802.11n_HT40 UNII 1 BAND 26 dB Bandwidth(CH 38)	802.11n_HT40 UNII 2A BAND 26 dB Bandwidth (CH 62)
	
802.11n_HT40 UNII 2C BAND 26 dB Bandwidth(CH 118)	**802.11n_HT40 UNII 3 BAND 26 dB Bandwidth (CH 151)**
	

▣ Test Plots(802.11ac(VHT20))

Note:

In order to simplify the report, attached plots were only the most wide channel.

802.11ac_VHT20 UNII 1 BAND 26 dB Bandwidth(CH 40)	802.11ac_VHT20 UNII 2A BAND 26 dB Bandwidth(CH 64)
	
802.11ac_VHT20 UNII 2C BAND 26 dB Bandwidth(CH 120)	**802.11ac_VHT20 UNII 3 BAND 26 dB Bandwidth(CH 165)**
	

▣ Test Plots(802.11ac(VHT40))

Note:

In order to simplify the report, attached plots were only the most wide channel.

802.11ac_VHT40 UNII 1 BAND 26 dB Bandwidth(CH 38)	802.11ac_VHT40 UNII 2A BAND 26 dB Bandwidth (CH 54)
	
802.11ac_VHT40 UNII 2C BAND 26 dB Bandwidth(CH 102)	**802.11ac_VHT40 UNII 3 BAND 26 dB Bandwidth (CH 151)**
	

▣ Test Plots(802.11ac(VHT80))

Note:

In order to simplify the report, attached plots were only the most wide channel.

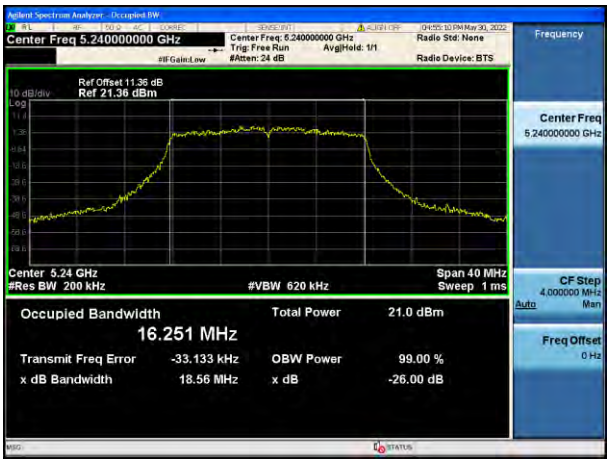
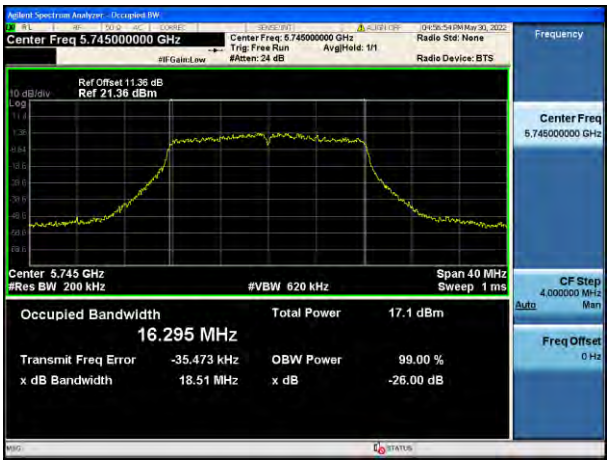
802.11ac_VHT80 UNII 1 BAND 26 dB Bandwidth(CH 42)	802.11ac_VHT80 UNII 2A BAND 26 dB Bandwidth (CH 58)
	
802.11ac_VHT80 UNII 2C BAND 26 dB Bandwidth(CH 122)	**802.11ac_VHT80 UNII 3 BAND 26 dB Bandwidth (CH 155)**
	

[Ant.2]

▣ Test Plots(802.11a)

Note:

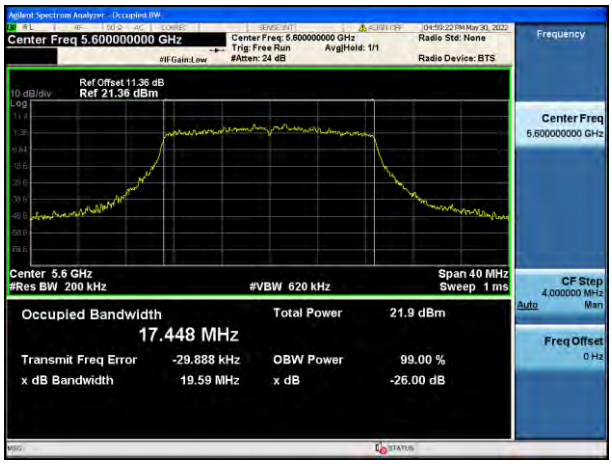
In order to simplify the report, attached plots were only the most wide channel.

802.11a UNII 1 BAND 26 dB Bandwidth (CH 48)	802.11a UNII 2A BAND 26 dB Bandwidth (CH 52)
	
802.11a UNII 2C BAND 26 dB Bandwidth (CH 120)	**802.11a UNII 3 BAND 26 dB Bandwidth (CH 149)**
	

▣ Test Plots(802.11n(HT20))

Note:

In order to simplify the report, attached plots were only the most wide channel.

802.11n_HT20 UNII 1 BAND 26 dB Bandwidth(CH 48)	802.11n_HT20 UNII 2A BAND 26 dB Bandwidth(CH 60)
	
802.11n_HT20 UNII 2C BAND 26 dB Bandwidth(CH 120)	**802.11n_HT20 UNII 3 BAND 26 dB Bandwidth(CH 165)**
	

▣ Test Plots(802.11n(HT40))

Note:

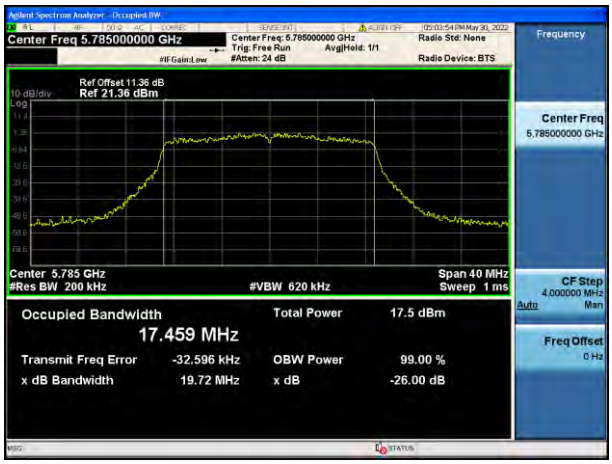
In order to simplify the report, attached plots were only the most wide channel.

802.11n_HT40 UNII 1 BAND 26 dB Bandwidth(CH 38)	802.11n_HT40 UNII 2A BAND 26 dB Bandwidth (CH 54)
	
802.11n_HT40 UNII 2C BAND 26 dB Bandwidth(CH 102)	**802.11n_HT40 UNII 3 BAND 26 dB Bandwidth (CH 159)**
	

▣ Test Plots(802.11ac(VHT20))

Note:

In order to simplify the report, attached plots were only the most wide channel.

802.11ac_VHT20 UNII 1 BAND 26 dB Bandwidth(CH 48)	802.11ac_VHT20 UNII 2A BAND 26 dB Bandwidth(CH 60)
	
802.11ac_VHT20 UNII 2C BAND 26 dB Bandwidth(CH 100)	**802.11ac_VHT20 UNII 3 BAND 26 dB Bandwidth(CH 157)**
	

▣ Test Plots(802.11ac(VHT40))

Note:

In order to simplify the report, attached plots were only the most wide channel.

802.11ac_VHT40 UNII 1 BAND 26 dB Bandwidth(CH 46)	802.11ac_VHT40 UNII 2A BAND 26 dB Bandwidth (CH 62)
	
802.11ac_VHT40 UNII 2C BAND 26 dB Bandwidth(CH 102)	**802.11ac_VHT40 UNII 3 BAND 26 dB Bandwidth (CH 159)**
	

▣ Test Plots(802.11ac(VHT80))

Note:

In order to simplify the report, attached plots were only the most wide channel.

802.11ac_VHT80 UNII 1 BAND 26 dB Bandwidth(CH 42)	802.11ac_VHT80 UNII 2A BAND 26 dB Bandwidth (CH 58)
	
802.11ac_VHT80 UNII 2C BAND 26 dB Bandwidth(CH 138)	**802.11ac_VHT80 UNII 3 BAND 26 dB Bandwidth (CH 155)**
	

10.3 6 dB BANDWIDTH

[Ant.1]

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.09	> 0.5	Pass
5785	157	15.58	> 0.5	Pass
5825	165	14.47	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.30	> 0.5	Pass
5785	157	15.07	> 0.5	Pass
5825	165	16.28	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.00	> 0.5	Pass
5795	159	35.15	> 0.5	Pass

802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.10	> 0.5	Pass
5785	157	14.97	> 0.5	Pass
5825	165	15.15	> 0.5	Pass

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.17	> 0.5	Pass
5795	159	33.93	> 0.5	Pass

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	72.68	> 0.5	Pass

[Ant.2]

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	14.99	> 0.5	Pass
5785	157	15.14	> 0.5	Pass
5825	165	11.38	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.12	> 0.5	Pass
5785	157	15.17	> 0.5	Pass
5825	165	16.30	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	33.92	> 0.5	Pass
5795	159	35.07	> 0.5	Pass

802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.17	> 0.5	Pass
5785	157	15.11	> 0.5	Pass
5825	165	15.08	> 0.5	Pass

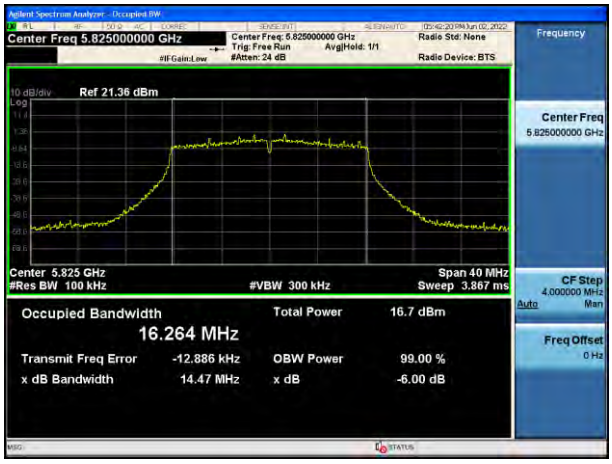
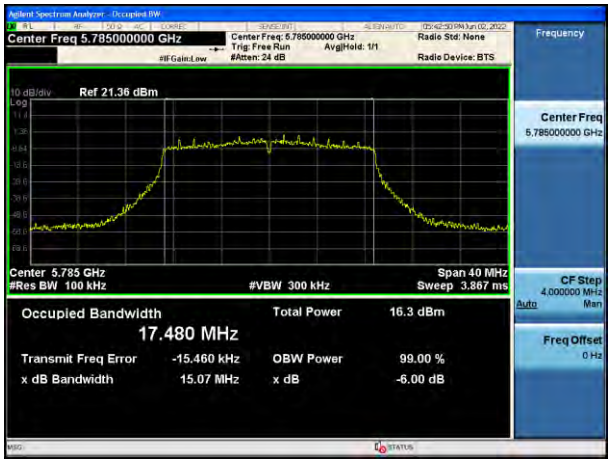
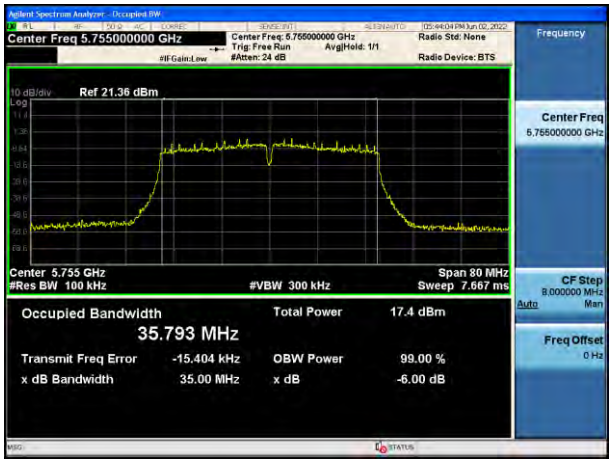
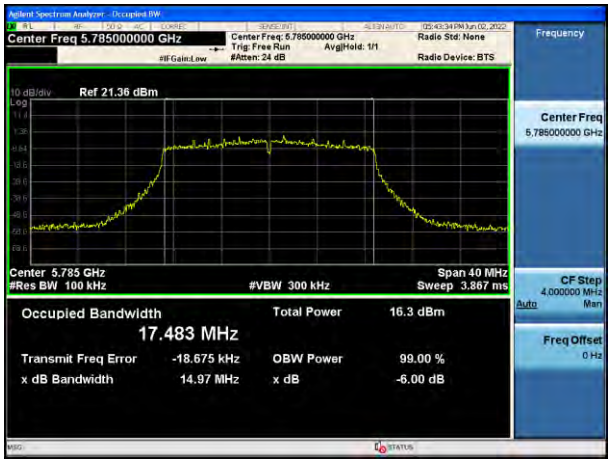
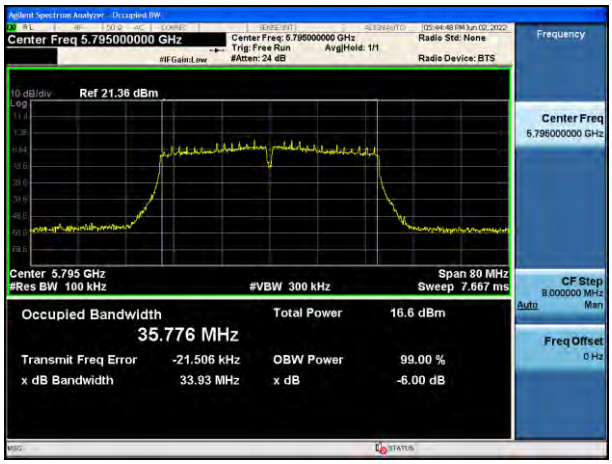
802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.17	> 0.5	Pass
5795	159	33.97	> 0.5	Pass

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	75.11	> 0.5	Pass

[Ant.1]

▣ Test Plots

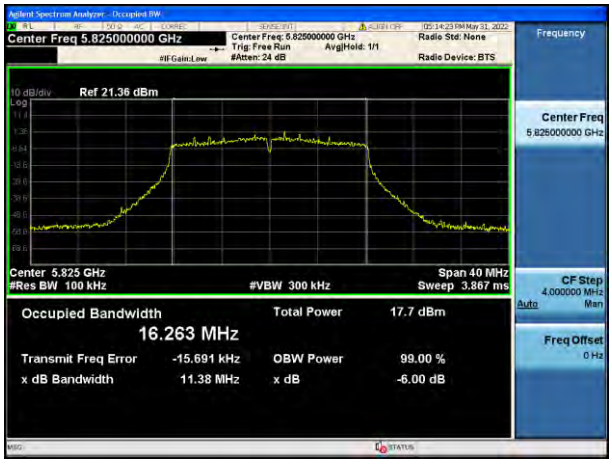
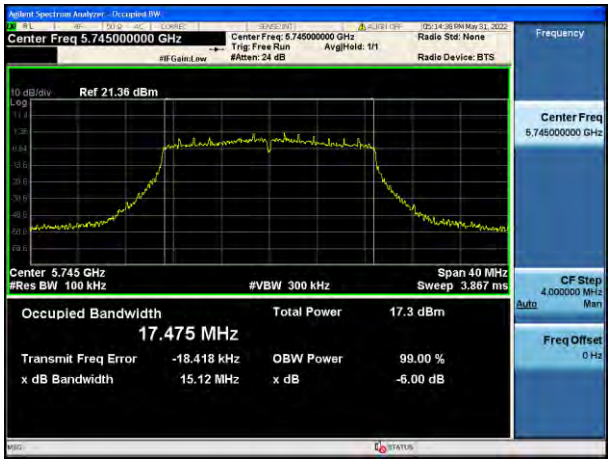
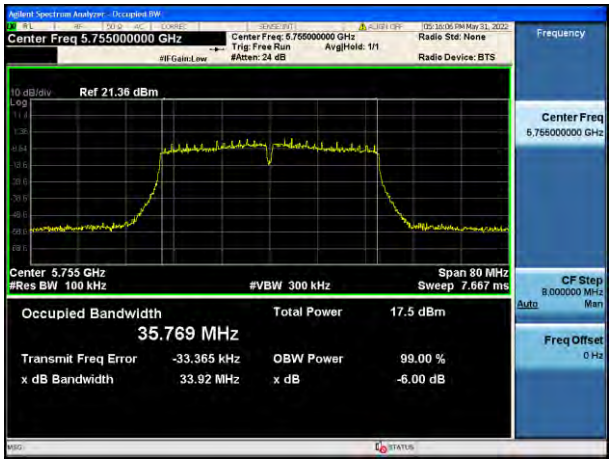
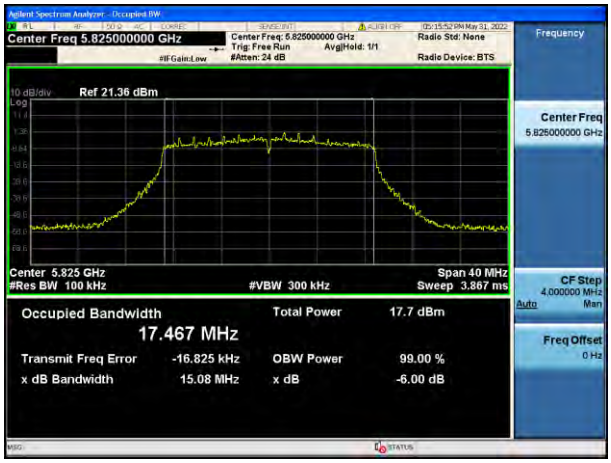
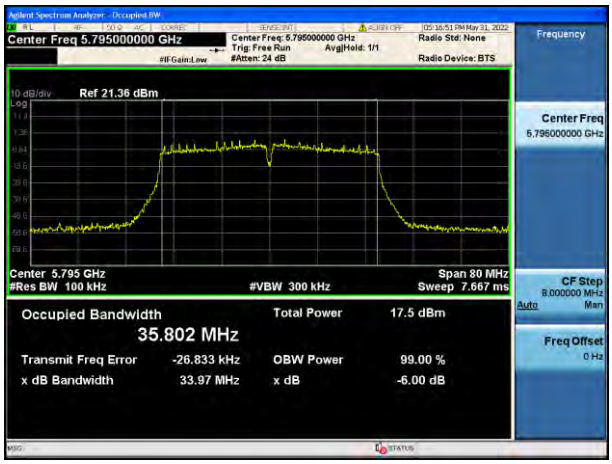
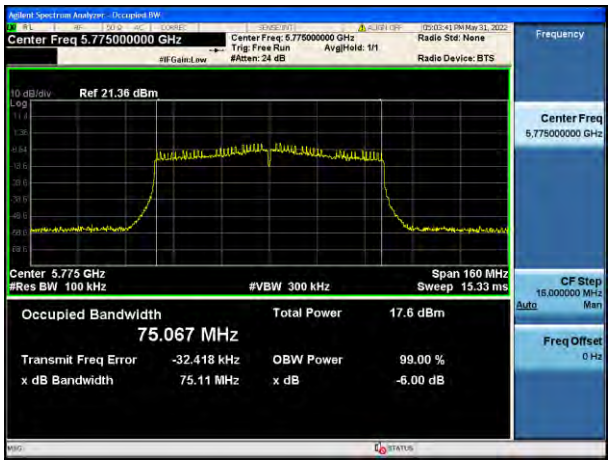
Note: In order to simplify the report, attached plots were only the most narrow channel.

802.11a (CH.165)	802.11n(HT20) (CH.157)
	
802.11n(HT40) (CH.151)	**802.11ac(VHT20) (CH.157)**
	
802.11ac(VHT40) (CH.159)	**802.11ac(VHT80) (CH.155)**
	

[Ant.2]

▣ Test Plots

Note: In order to simplify the report, attached plots were only the most narrow channel.

802.11a (CH.165)	802.11n(HT20) (CH.149)
	
802.11n(HT40) (CH.151)	**802.11ac(VHT20) (CH.165)**
	
802.11ac(VHT40) (CH.159)	**802.11ac(VHT80) (CH.155)**
	

10.4 OUTPUT POWER MEASUREMENT

Straddle channel data in the table below are for reporting purposes only.

Straddle channel data were added in section 10.7.3.

Limit

(UNII 1) : 23.98 dBm

(UNII 2A, 2C) : 23.98 dBm or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)

(UNII 3) : 30.00 dBm

[Ant.1]

802.11a Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate [Mbps]
Frequency [MHz]	Channel No.					
5180	36	14.36	0.292	14.65	23.98	6M
5200	40	14.40	0.292	14.69	23.98	6M
5240	48	14.33	0.292	14.62	23.98	6M
5260	52	14.70	0.292	15.00	23.72	6M
5300	60	14.76	0.292	15.05	23.61	6M
5320	64	14.69	0.292	14.98	23.67	6M
5500	100	14.19	0.292	14.48	23.67	6M
5600	120	15.36	0.292	15.66	23.68	6M
5720	144	14.11	0.292	14.40	23.69	6M
5745	149	10.54	0.292	10.83	30.00	6M
5785	157	9.54	0.292	9.83	30.00	6M
5825	165	9.67	0.292	9.96	30.00	6M

802.11n(20 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5180	36	14.13	0.339	14.47	23.98	MCS0
5200	40	14.03	0.339	14.37	23.98	MCS0
5240	48	14.07	0.339	14.41	23.98	MCS0
5260	52	14.54	0.339	14.88	23.91	MCS0
5300	60	14.46	0.339	14.80	23.96	MCS0
5320	64	14.49	0.339	14.83	23.88	MCS0
5500	100	14.00	0.339	14.34	23.90	MCS0
5600	120	15.13	0.339	15.47	23.88	MCS0
5720	144	13.87	0.339	14.21	23.96	MCS0
5745	149	10.28	0.339	10.62	30.00	MCS0
5785	157	9.31	0.339	9.65	30.00	MCS0
5825	165	9.54	0.339	9.87	30.00	MCS0

802.11n(40 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5190	38	14.38	0.624	15.00	23.98	MCS0
5230	46	14.39	0.624	15.01	23.98	MCS0
5270	54	14.58	0.624	15.20	23.98	MCS0
5310	62	14.42	0.624	15.04	23.98	MCS0
5510	102	14.42	0.624	15.04	23.98	MCS0
5590	118	15.43	0.624	16.05	23.98	MCS0
5710	142	14.50	0.624	15.12	23.98	MCS0
5755	151	9.81	0.624	10.43	30.00	MCS0
5795	159	8.86	0.624	9.49	30.00	MCS0

802.11ac(20 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5180	36	14.85	0.322	15.17	23.98	MCS0
5200	40	14.80	0.322	15.12	23.98	MCS0
5240	48	14.85	0.322	15.18	23.98	MCS0
5260	52	14.53	0.322	14.86	23.90	MCS0
5300	60	14.50	0.322	14.83	23.90	MCS0
5320	64	14.56	0.322	14.88	23.92	MCS0
5500	100	14.04	0.322	14.36	23.87	MCS0
5600	120	15.10	0.322	15.43	23.89	MCS0
5720	144	13.92	0.322	14.24	23.87	MCS0
5745	149	10.29	0.322	10.61	30.00	MCS0
5785	157	9.26	0.322	9.58	30.00	MCS0
5825	165	9.55	0.322	9.87	30.00	MCS0

802.11ac(40 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5190	38	13.65	0.654	14.31	23.98	MCS0
5230	46	13.66	0.654	14.32	23.98	MCS0
5270	54	13.94	0.654	14.59	23.98	MCS0
5310	62	14.06	0.654	14.72	23.98	MCS0
5510	102	13.53	0.654	14.19	23.98	MCS0
5590	118	14.76	0.654	15.42	23.98	MCS0
5710	142	13.46	0.654	14.11	23.98	MCS0
5755	151	9.76	0.654	10.42	30.00	MCS0
5795	159	8.84	0.654	9.50	30.00	MCS0

802.11ac(80 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5210	42	12.56	1.178	13.74	23.98	MCS0
5290	58	12.67	1.178	13.85	23.98	MCS0
5530	106	12.35	1.178	13.53	23.98	MCS0
5610	122	12.63	1.178	13.81	23.98	MCS0
5690	138	12.56	1.178	13.74	23.98	MCS0
5775	155	7.87	1.178	9.05	30.00	MCS0

[Ant.2]

802.11a Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate [Mbps]
Frequency [MHz]	Channel No.					
5180	36	13.74	0.292	14.03	23.98	6M
5200	40	13.76	0.292	14.05	23.98	6M
5240	48	14.21	0.292	14.50	23.98	6M
5260	52	14.62	0.292	14.91	23.69	6M
5300	60	14.66	0.292	14.95	23.65	6M
5320	64	15.40	0.292	15.69	23.65	6M
5500	100	14.28	0.292	14.57	23.61	6M
5600	120	15.60	0.292	15.89	23.68	6M
5720	144	15.56	0.292	15.85	23.67	6M
5745	149	9.56	0.292	9.85	30.00	6M
5785	157	10.15	0.292	10.44	30.00	6M
5825	165	10.29	0.292	10.58	30.00	6M

802.11n(20 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5180	36	13.70	0.339	14.04	23.98	MCS0
5200	40	13.75	0.339	14.08	23.98	MCS0
5240	48	14.12	0.339	14.46	23.98	MCS0
5260	52	14.40	0.339	14.74	23.89	MCS0
5300	60	14.42	0.339	14.76	23.96	MCS0
5320	64	15.20	0.339	15.54	23.86	MCS0
5500	100	14.02	0.339	14.36	23.85	MCS0
5600	120	15.36	0.339	15.70	23.92	MCS0
5720	144	15.32	0.339	15.66	23.85	MCS0
5745	149	10.34	0.339	10.68	30.00	MCS0
5785	157	10.21	0.339	10.55	30.00	MCS0
5825	165	10.29	0.339	10.63	30.00	MCS0

802.11n(40 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5190	38	14.19	0.624	14.81	23.98	MCS0
5230	46	14.53	0.624	15.16	23.98	MCS0
5270	54	14.91	0.624	15.54	23.98	MCS0
5310	62	15.61	0.624	16.23	23.98	MCS0
5510	102	14.55	0.624	15.17	23.98	MCS0
5590	118	15.77	0.624	16.39	23.98	MCS0
5710	142	15.69	0.624	16.31	23.98	MCS0
5755	151	9.89	0.624	10.51	30.00	MCS0
5795	159	10.09	0.624	10.71	30.00	MCS0

802.11ac(20 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5180	36	14.48	0.322	14.80	23.98	MCS0
5200	40	14.51	0.322	14.83	23.98	MCS0
5240	48	15.01	0.322	15.33	23.98	MCS0
5260	52	14.37	0.322	14.69	23.88	MCS0
5300	60	14.41	0.322	14.73	23.93	MCS0
5320	64	15.19	0.322	15.51	23.93	MCS0
5500	100	14.06	0.322	14.39	23.93	MCS0
5600	120	15.36	0.322	15.69	23.92	MCS0
5720	144	15.25	0.322	15.58	23.91	MCS0
5745	149	10.33	0.322	10.65	30.00	MCS0
5785	157	10.55	0.322	10.88	30.00	MCS0
5825	165	10.64	0.322	10.97	30.00	MCS0

802.11ac(40 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5190	38	13.10	0.654	13.75	23.98	MCS0
5230	46	13.53	0.654	14.18	23.98	MCS0
5270	54	13.87	0.654	14.52	23.98	MCS0
5310	62	14.67	0.654	15.33	23.98	MCS0
5510	102	13.55	0.654	14.20	23.98	MCS0
5590	118	14.97	0.654	15.62	23.98	MCS0
5710	142	14.86	0.654	15.52	23.98	MCS0
5755	151	9.94	0.654	10.60	30.00	MCS0
5795	159	9.81	0.654	10.46	9.81	MCS0

802.11ac(80 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5210	42	12.33	1.178	13.51	23.98	MCS0
5290	58	12.61	1.178	13.79	23.98	MCS0
5530	106	12.52	1.178	13.70	23.98	MCS0
5610	122	12.93	1.178	14.11	23.98	MCS0
5690	138	12.88	1.178	14.06	23.98	MCS0
5775	155	8.53	1.178	9.71	30.00	MCS0

[MIMO]

802.11a Mode		Ant.1 Measured Power [dBm] + Duty Cycle Factor[dB]	Ant.2 Measured Power (dBm) + Duty Cycle Factor[dB]	MIMO Total Power [dBm]	Limit [dBm]	Worstcase Datarate [Mbps]
Frequency [MHz]	Channel No.					
5180	36	14.65	14.03	17.36	23.98	6M
5200	40	14.69	14.05	17.39	23.98	6M
5240	48	14.62	14.50	17.57	23.98	6M
5260	52	15.00	14.91	17.97	23.98	6M
5300	60	15.05	14.95	18.01	23.98	6M
5320	64	14.98	15.69	18.36	23.98	6M
5500	100	14.48	14.57	17.54	23.98	6M
5600	120	15.66	15.89	18.79	23.98	6M
5720	144	14.40	15.85	18.20	23.98	6M
5745	149	10.83	9.85	13.38	30.00	6M
5785	157	9.83	10.44	13.15	30.00	6M
5825	165	9.96	10.58	13.29	30.00	6M

802.11n(20 MHz) Mode		Ant.1 Measured Power [dBm] + Duty Cycle Factor[dB]	Ant.2 Measured Power (dBm) + Duty Cycle Factor[dB]	MIMO Total Power [dBm]	Limit [dBm]	Worstcase MCS INDEX
Frequency [MHz]	Channel No.					
5180	36	14.47	14.04	17.27	23.98	MCS0
5200	40	14.37	14.08	17.24	23.98	MCS0
5240	48	14.41	14.46	17.45	23.98	MCS0
5260	52	14.88	14.74	17.82	23.98	MCS0
5300	60	14.80	14.76	17.79	23.98	MCS0
5320	64	14.83	15.54	18.21	23.98	MCS0
5500	100	14.34	14.36	17.36	23.98	MCS0
5600	120	15.47	15.70	18.60	23.98	MCS0
5720	144	14.21	15.66	18.00	23.98	MCS0
5745	149	10.62	10.68	13.66	30.00	MCS0
5785	157	9.65	10.55	13.13	30.00	MCS0
5825	165	9.87	10.63	13.28	30.00	MCS0

802.11n(40 MHz) Mode		Ant.1 Measured Power [dBm] + Duty Cycle Factor[dB]	Ant.2 Measured Power (dBm) + Duty Cycle Factor[dB]	MIMO Total Power [dBm]	Limit [dBm]	Worstcase MCS INDEX
Frequency [MHz]	Channel No.					
5190	38	15.00	14.81	17.92	23.98	MCS0
5230	46	15.01	15.16	18.10	23.98	MCS0
5270	54	15.20	15.54	18.38	23.98	MCS0
5310	62	15.04	16.23	18.69	23.98	MCS0
5510	102	15.04	15.17	18.12	23.98	MCS0
5590	118	16.05	16.39	19.24	23.98	MCS0
5710	142	15.12	16.31	18.77	23.98	MCS0
5755	151	10.43	10.51	13.48	30.00	MCS0
5795	159	9.49	10.71	13.15	30.00	MCS0

802.11ac(20 MHz) Mode		Ant.1 Measured Power [dBm] + Duty Cycle Factor[dB]	Ant.2 Measured Power (dBm) + Duty Cycle Factor[dB]	MIMO Total Power [dBm]	Limit [dBm]	Worstcase MCS INDEX
Frequency [MHz]	Channel No.					
5180	36	15.17	14.80	18.00	23.98	MCS0
5200	40	15.12	14.83	17.99	23.98	MCS0
5240	48	15.18	15.33	18.26	23.98	MCS0
5260	52	14.86	14.69	17.78	23.98	MCS0
5300	60	14.83	14.73	17.79	23.98	MCS0
5320	64	14.88	15.51	18.22	23.98	MCS0
5500	100	14.36	14.39	17.38	23.98	MCS0
5600	120	15.43	15.69	18.57	23.98	MCS0
5720	144	14.24	15.58	17.97	23.98	MCS0
5745	149	10.61	10.65	13.64	30.00	MCS0
5785	157	9.58	10.88	13.29	30.00	MCS0
5825	165	9.87	10.97	13.46	30.00	MCS0

802.11ac(40 MHz) Mode		Ant.1 Measured Power [dBm] + Duty Cycle Factor[dB]	Ant.2 Measured Power (dBm) + Duty Cycle Factor[dB]	MIMO Total Power [dBm]	Limit [dBm]	Worstcase MCS INDEX
Frequency [MHz]	Channel No.					
5190	38	14.31	13.75	17.05	23.98	MCS0
5230	46	14.32	14.18	17.26	23.98	MCS0
5270	54	14.59	14.52	17.57	23.98	MCS0
5310	62	14.72	15.33	18.04	23.98	MCS0
5510	102	14.19	14.20	17.21	23.98	MCS0
5590	118	15.42	15.62	18.53	23.98	MCS0
5710	142	14.11	15.52	17.88	23.98	MCS0
5755	151	10.42	10.60	13.52	30.00	MCS0
5795	159	9.50	10.46	13.01	30.00	MCS0

802.11ac(80 MHz) Mode		Ant.1 Measured Power [dBm] + Duty Cycle Factor[dB]	Ant.2 Measured Power (dBm) + Duty Cycle Factor[dB]	MIMO Total Power [dBm]	Limit [dBm]	Worstcase MCS INDEX
Frequency [MHz]	Channel No.					
5210	42	13.74	13.51	16.63	23.98	MCS0
5290	58	13.85	13.79	16.83	23.98	MCS0
5530	106	13.53	13.70	16.62	23.98	MCS0
5610	122	13.81	14.11	16.97	23.98	MCS0
5690	138	13.74	14.06	16.91	23.98	MCS0
5775	155	9.05	9.71	12.40	30.00	MCS0

10.5 POWER SPECTRAL DENSITY

[Ant.1]

802.11a Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase Datarate [Mbps]	Limit
Frequency [MHz]	Channel No.					
5180	36	4.777	0.292	5.069	6M	11 dBm/MHz
5200	40	4.768	0.292	5.060	6M	
5240	48	***4.933***	0.292	***5.225***	6M	
5260	52	***5.293***	0.292	***5.585***	6M	
5300	60	5.057	0.292	5.349	6M	
5320	64	5.091	0.292	5.383	6M	
5500	100	4.802	0.292	5.094	6M	
5600	120	***5.078***	0.292	***5.370***	6M	
5720	144	4.453	0.292	4.745	6M	
5745	149	***-1.740***	0.292	***-1.448***	6M	30 dBm/500 kHz
5785	157	-2.999	0.292	-2.707	6M	
5825	165	-2.256	0.292	-1.964	6M	

802.11n(20 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5180	36	***4.449***	0.339	***4.788***	MCS0	11 dBm/MHz
5200	40	4.148	0.339	4.487	MCS0	
5240	48	4.365	0.339	4.704	MCS0	
5260	52	4.781	0.339	5.120	MCS0	
5300	60	***4.827***	0.339	***5.166***	MCS0	
5320	64	4.725	0.339	5.064	MCS0	
5500	100	4.306	0.339	4.645	MCS0	
5600	120	***5.203***	0.339	***5.542***	MCS0	
5720	144	4.413	0.339	4.752	MCS0	
5745	149	***-2.273***	0.339	***-1.934***	MCS0	30 dBm/500 kHz
5785	157	-3.243	0.339	-2.904	MCS0	
5825	165	-3.163	0.339	-2.824	MCS0	

802.11n(40 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5190	38	***1.652***	0.624	***2.276***	MCS0	11 dBm/MHz
5230	46	1.543	0.624	2.167	MCS0	
5270	54	***2.033***	0.624	***2.657***	MCS0	
5310	62	1.234	0.624	1.858	MCS0	
5510	102	1.763	0.624	2.387	MCS0	
5590	118	***2.995***	0.624	***3.619***	MCS0	
5710	142	1.889	0.624	2.513	MCS0	
5755	151	***-5.308***	0.624	***-4.684***	MCS0	30 dBm /500 kHz
5795	159	-6.640	0.624	-6.016	MCS0	

802.11ac(20 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5180	36	***5.316***	0.322	***5.638***	MCS0	11 dBm/MHz
5200	40	5.061	0.322	5.383	MCS0	
5240	48	5.186	0.322	5.508	MCS0	
5260	52	***4.752***	0.322	***5.074***	MCS0	
5300	60	4.624	0.322	4.946	MCS0	
5320	64	4.745	0.322	5.067	MCS0	
5500	100	4.354	0.322	4.676	MCS0	
5600	120	***5.686***	0.322	***6.008***	MCS0	
5720	144	4.151	0.322	4.473	MCS0	
5745	149	***-2.120***	0.322	***-1.798***	MCS0	30 dBm/500 kHz
5785	157	-3.001	0.322	-2.679	MCS0	
5825	165	-2.857	0.322	-2.535	MCS0	

802.11ac(40 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5190	38	***1.227***	0.654	***1.881***	MCS0	11 dBm/MHz
5230	46	1.090	0.654	1.744	MCS0	
5270	54	1.128	0.654	1.782	MCS0	
5310	62	***1.565***	0.654	***2.219***	MCS0	
5510	102	0.754	0.654	1.408	MCS0	
5590	118	***1.876***	0.654	***2.530***	MCS0	
5710	142	0.750	0.654	1.404	MCS0	
5755	151	***-5.566***	0.654	***-4.912***	MCS0	30 dBm/500 kHz
5795	159	-6.353	0.654	-5.699	MCS0	

802.11ac(80 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5210	42	***-2.250***	1.178	***-1.072***	MCS0	11 dBm/MHz
5290	58	***-2.274***	1.178	***-1.096***	MCS0	
5530	106	-2.699	1.178	-1.521	MCS0	
5610	122	***-2.043***	1.178	***-0.865***	MCS0	
5690	138	-2.896	1.178	-1.718	MCS0	
5775	155	***-10.142***	1.178	***-8.964***	MCS0	30 dBm/500 kHz

[Ant.2]

802.11a Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase Datarate [Mbps]	Limit
Frequency [MHz]	Channel No.					
5180	36	3.963	0.292	4.255	6M	11 dBm/MHz
5200	40	3.960	0.292	4.252	6M	
5240	48	***4.251***	0.292	***4.543***	6M	
5260	52	4.787	0.292	5.079	6M	
5300	60	4.971	0.292	5.263	6M	
5320	64	***5.785***	0.292	***6.077***	6M	
5500	100	4.533	0.292	4.825	6M	
5600	120	5.880	0.292	6.172	6M	
5720	144	***5.899***	0.292	***6.191***	6M	
5745	149	-1.951	0.292	-1.659	6M	30 dBm/500 kHz
5785	157	-1.691	0.292	-1.399	6M	
5825	165	***-1.390***	0.292	***-1.098***	6M	

802.11n(20 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5180	36	3.434	0.339	3.773	MCS0	11 dBm/MHz
5200	40	3.900	0.339	4.239	MCS0	
5240	48	***4.063***	0.339	***4.402***	MCS0	
5260	52	4.537	0.339	4.876	MCS0	
5300	60	4.578	0.339	4.917	MCS0	
5320	64	***5.527***	0.339	***5.866***	MCS0	
5500	100	4.035	0.339	4.374	MCS0	
5600	120	***5.656***	0.339	***5.995***	MCS0	
5720	144	5.383	0.339	5.722	MCS0	
5745	149	-2.326	0.339	-1.987	MCS0	30 dBm/500 kHz
5785	157	-2.193	0.339	-1.854	MCS0	
5825	165	***-1.875***	0.339	***-1.536***	MCS0	

802.11n(40 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5190	38	***2.171***	0.624	***2.795***	MCS0	11 dBm/MHz
5230	46	2.033	0.624	2.657	MCS0	
5270	54	1.889	0.624	2.513	MCS0	
5310	62	***2.778***	0.624	***3.402***	MCS0	
5510	102	1.816	0.624	2.440	MCS0	
5590	118	***3.142***	0.624	***3.766***	MCS0	
5710	142	2.914	0.624	3.538	MCS0	
5755	151	-5.556	0.624	-4.932	MCS0	30 dBm /500 kHz
5795	159	***-5.384***	0.624	***-4.760***	MCS0	

802.11ac(20 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5180	36	4.785	0.322	5.107	MCS0	11 dBm/MHz
5200	40	4.839	0.322	5.161	MCS0	
5240	48	***5.374***	0.322	***5.696***	MCS0	
5260	52	4.522	0.322	4.844	MCS0	
5300	60	4.564	0.322	4.886	MCS0	
5320	64	***5.466***	0.322	***5.788***	MCS0	
5500	100	4.258	0.322	4.580	MCS0	
5600	120	***5.464***	0.322	***5.786***	MCS0	
5720	144	5.398	0.322	5.720	MCS0	
5745	149	-2.334	0.322	-2.012	MCS0	30 dBm/500 kHz
5785	157	-1.997	0.322	-1.675	MCS0	
5825	165	***-1.527***	0.322	***-1.205***	MCS0	

802.11ac(40 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5190	38	0.193	0.654	0.847	MCS0	11 dBm/MHz
5230	46	***0.696***	0.654	***1.350***	MCS0	
5270	54	1.433	0.654	2.087	MCS0	
5310	62	***2.214***	0.654	***2.868***	MCS0	
5510	102	0.815	0.654	1.469	MCS0	
5590	118	***2.624***	0.654	***3.278***	MCS0	
5710	142	2.088	0.654	2.742	MCS0	
5755	151	***-5.554***	0.654	***-4.900***	MCS0	30 dBm/500 kHz
5795	159	-5.832	0.654	-5.178	MCS0	

802.11ac(80 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5210	42	***-3.022***	1.178	***-1.844***	MCS0	11 dBm/MHz
5290	58	***-2.171***	1.178	***-0.993***	MCS0	
5530	106	-3.065	1.178	-1.887	MCS0	
5610	122	***-1.695***	1.178	***-0.517***	MCS0	
5690	138	-2.218	1.178	-1.040	MCS0	
5775	155	***-9.002***	1.178	***-7.824***	MCS0	30 dBm/500 kHz

[MIMO]

802.11a Mode		ANT.1 Measured PSD[dBm] + Duty Cycle Factor [dB]	ANT.2 Measured PSD[dBm] + Duty Cycle Factor [dB]	MIMO Total PSD [dBm/MHz]	Worstcase Datarate [Mbps]	Limit
Frequency [MHz]	Channel No.					
5180	36	5.069	4.255	7.691	6M	11 dBm/MHz
5200	40	5.060	4.252	7.685	6M	
5240	48	5.225	4.543	7.907	6M	
5260	52	5.585	5.079	8.349	6M	
5300	60	5.349	5.263	8.316	6M	
5320	64	5.383	6.077	8.754	6M	
5500	100	5.094	4.825	7.971	6M	
5600	120	5.370	6.172	8.799	6M	
5720	144	4.745	6.191	8.538	6M	
5745	149	-1.448	-1.659	1.458	6M	30 dBm/500 kHz
5785	157	-2.707	-1.399	1.006	6M	
5825	165	-1.964	-1.098	1.500	6M	

802.11n(20 MHz) Mode		ANT.1 Measured PSD[dBm] + Duty Cycle Factor [dB]	ANT.2 Measured PSD[dBm] + Duty Cycle Factor [dB]	MIMO Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5180	36	4.788	3.773	7.321	MCS0	11 dBm/MHz
5200	40	4.487	4.239	7.376	MCS0	
5240	48	4.704	4.402	7.566	MCS0	
5260	52	5.120	4.876	8.010	MCS0	
5300	60	5.166	4.917	8.054	MCS0	
5320	64	5.064	5.866	8.494	MCS0	
5500	100	4.645	4.374	7.522	MCS0	
5600	120	5.542	5.995	8.785	MCS0	
5720	144	4.752	5.722	8.275	MCS0	
5745	149	-1.934	-1.987	1.050	MCS0	30 dBm/500 kHz
5785	157	-2.904	-1.854	0.663	MCS0	
5825	165	-2.824	-1.536	0.878	MCS0	

802.11n(40 MHz) Mode		ANT.1 Measured PSD[dBm] + Duty Cycle Factor [dB]	ANT.2 Measured PSD[dBm] + Duty Cycle Factor [dB]	MIMO Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5190	38	2.276	2.795	5.553	MCS0	11 dBm/MHz
5230	46	2.167	2.657	5.429	MCS0	
5270	54	2.657	2.513	5.596	MCS0	
5310	62	1.858	3.402	5.708	MCS0	
5510	102	2.387	2.440	5.424	MCS0	
5590	118	3.619	3.766	6.703	MCS0	
5710	142	2.513	3.538	6.066	MCS0	
5755	151	-4.684	-4.932	-1.796	MCS0	30 dBm/500 kHz
5795	159	-6.016	-4.760	-2.333	MCS0	

802.11ac(20 MHz) Mode		ANT.1 Measured PSD[dBm] + Duty Cycle Factor [dB]	ANT.2 Measured PSD[dBm] + Duty Cycle Factor [dB]	MIMO Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5180	36	5.638	5.107	8.391	MCS0	11 dBm/MHz
5200	40	5.383	5.161	8.284	MCS0	
5240	48	5.508	5.696	8.613	MCS0	
5260	52	5.074	4.844	7.971	MCS0	
5300	60	4.946	4.886	7.926	MCS0	
5320	64	5.067	5.788	8.453	MCS0	
5500	100	4.676	4.580	7.638	MCS0	
5600	120	6.008	5.786	8.909	MCS0	
5720	144	4.473	5.720	8.151	MCS0	
5745	149	-1.798	-2.012	1.106	MCS0	30 dBm/500 kHz
5785	157	-2.679	-1.675	0.862	MCS0	
5825	165	-2.535	-1.205	1.191	MCS0	

802.11ac(40 MHz) Mode		ANT.1 Measured PSD[dBm] + Duty Cycle Factor [dB]	ANT.2 Measured PSD[dBm] + Duty Cycle Factor [dB]	MIMO Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5190	38	1.881	0.847	4.405	MCS0	11 dBm/MHz
5230	46	1.744	1.350	4.562	MCS0	
5270	54	1.782	2.087	4.948	MCS0	
5310	62	2.219	2.868	5.566	MCS0	
5510	102	1.408	1.469	4.449	MCS0	
5590	118	2.530	3.278	5.931	MCS0	
5710	142	1.404	2.742	5.135	MCS0	
5755	151	-4.912	-4.900	-1.895	MCS0	30 dBm/500 kHz
5795	159	-5.699	-5.178	-2.420	MCS0	

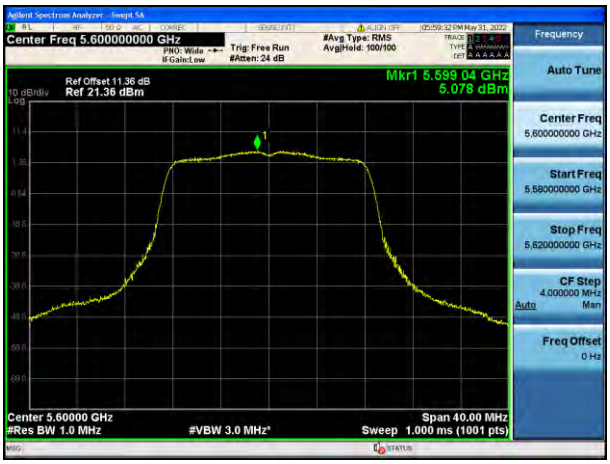
802.11ac(80 MHz) Mode		ANT.1 Measured PSD[dBm] + Duty Cycle Factor [dB]	ANT.2 Measured PSD[dBm] + Duty Cycle Factor [dB]	MIMO Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5210	42	-1.072	-1.844	1.569	MCS0	11 dBm/MHz
5290	58	-1.096	-0.993	1.966	MCS0	
5530	106	-1.521	-1.887	1.310	MCS0	
5610	122	-0.865	-0.517	2.322	MCS0	
5690	138	-1.718	-1.040	1.644	MCS0	
5775	155	-8.964	-7.824	-5.347	MCS0	30 dBm/500 kHz

[Ant.1]

▣ Test Plots(802.11a)

Note:

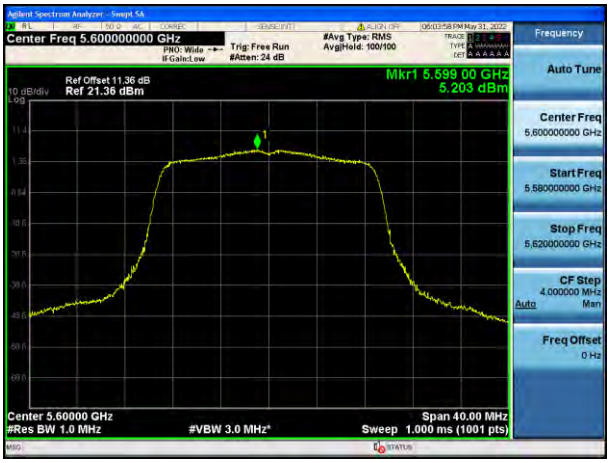
In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 48)	UNII 2A (Ch. 52)
	
UNII 2C (Ch. 120)	**UNII 3 (Ch. 149)**
	

▣ Test Plots(802.11n(HT20))

Note:

In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 36)	UNII 2A (Ch. 60)
	
UNII 2C (Ch. 120)	**UNII 3 (Ch. 149)**
	

▣ Test Plots(802.11n(HT40))

Note:

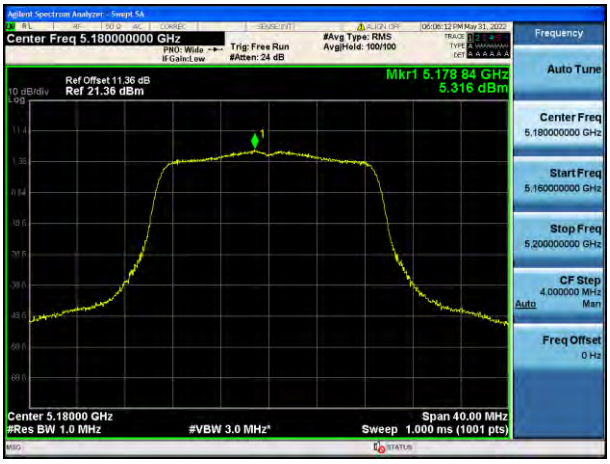
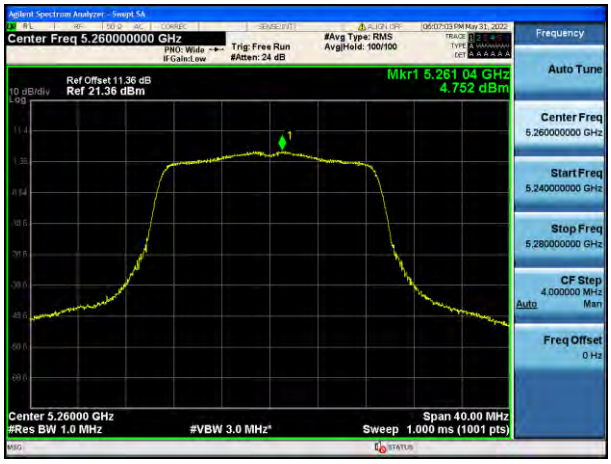
In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 38)	UNII 2A (Ch. 54)
	
UNII 2C (Ch. 118)	**UNII 3 (Ch. 151)**
	

▣ Test Plots(802.11ac(VHT20))

Note:

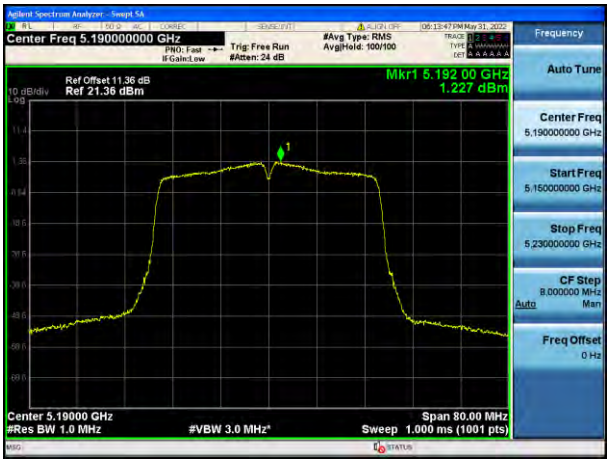
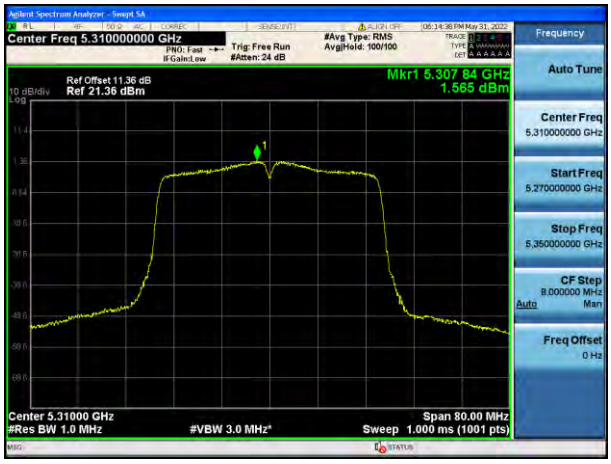
In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 36)	UNII 2A (Ch. 52)
	
UNII 2C (Ch. 120)	**UNII 3 (Ch. 149)**
	

▣ Test Plots(802.11ac(VHT40))

Note:

In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 38)	UNII 2A (Ch. 62)
	
UNII 2C (Ch. 118)	**UNII 3 (Ch. 151)**
	

▣ Test Plots(802.11ac(VHT80))

Note:

In order to simplify the report, attached plots were only channel of highest power.

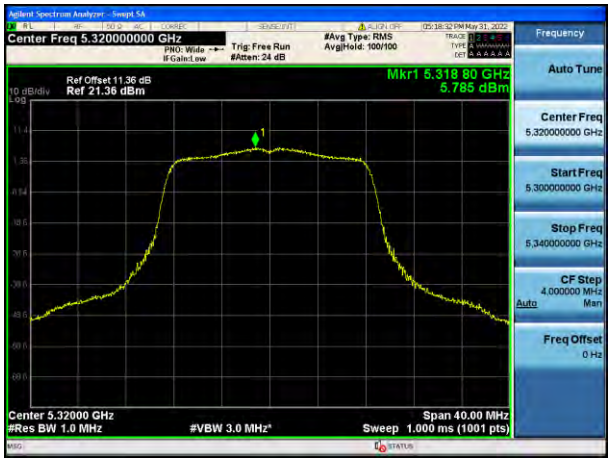
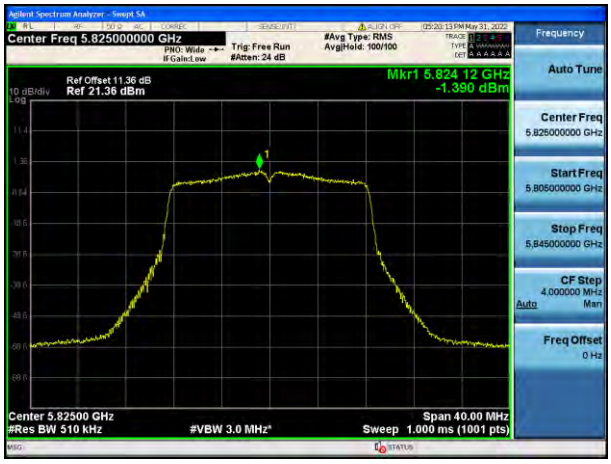
UNII 1 (Ch. 42)	UNII 2A (Ch. 58)
	
UNII 2C (Ch. 122)	**UNII 3 (Ch. 155)**
	

[Ant.2]

▣ Test Plots(802.11a)

Note:

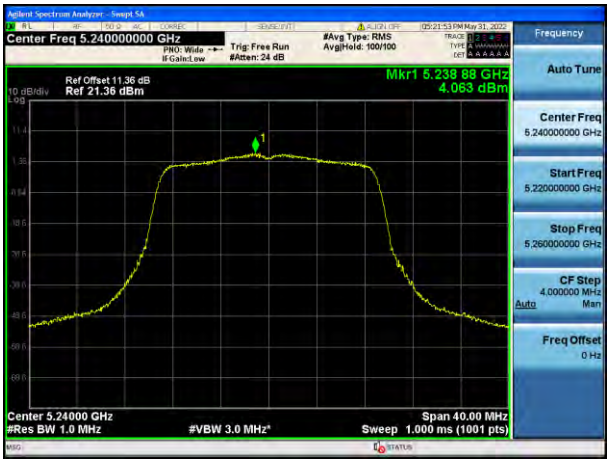
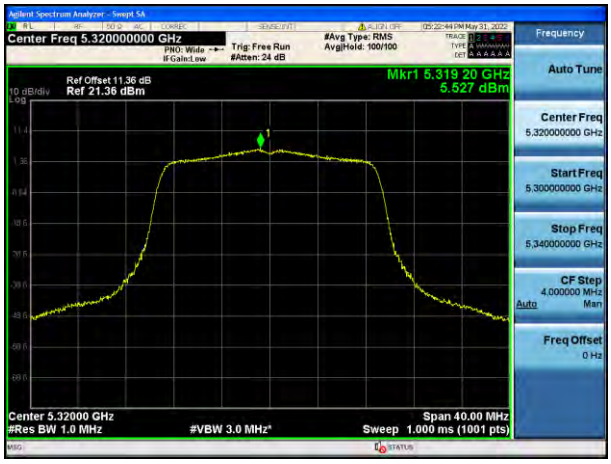
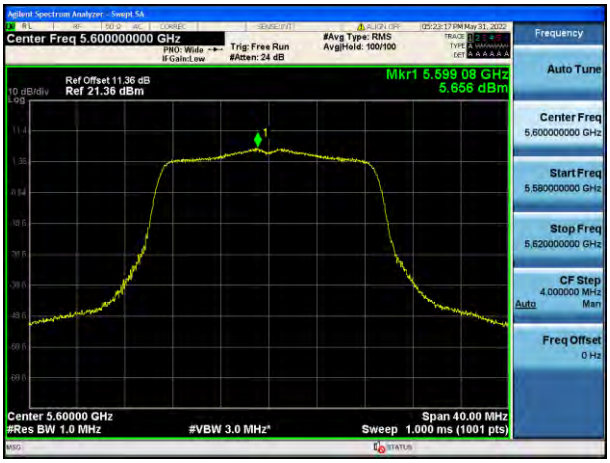
In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 48)	UNII 2A (Ch. 64)
	
UNII 2C (Ch. 144)	**UNII 3 (Ch. 165)**
	

▣ Test Plots(802.11n(HT20))

Note:

In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 48)	UNII 2A (Ch. 64)
	
UNII 2C (Ch. 120)	**UNII 3 (Ch. 165)**
	

▣ Test Plots(802.11n(HT40))

Note:

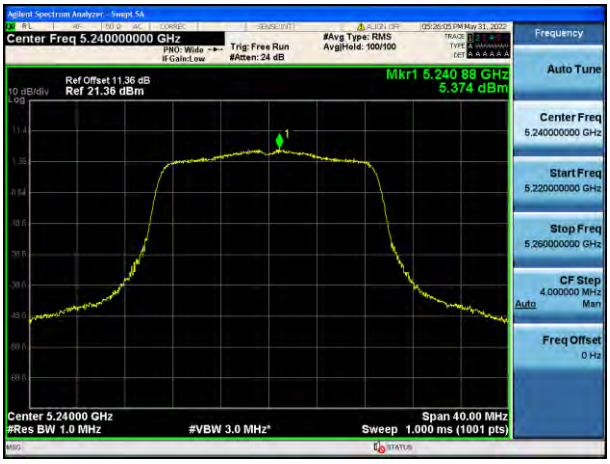
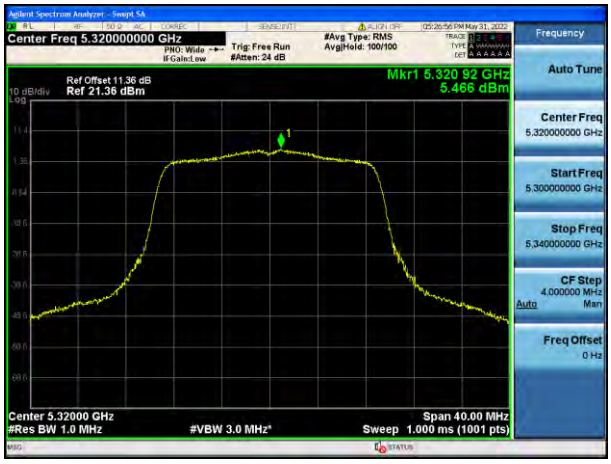
In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 38)	UNII 2A (Ch. 62)
	
UNII 2C (Ch. 118)	**UNII 3 (Ch. 159)**
	

▣ Test Plots(802.11ac(VHT20))

Note:

In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 48)	UNII 2A (Ch. 64)
	
UNII 2C (Ch. 120)	**UNII 3 (Ch. 165)**
	

▣ Test Plots(802.11ac(VHT40))

Note:

In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 46)	UNII 2A (Ch. 62)
	
UNII 2C (Ch. 118)	**UNII 3 (Ch. 151)**
	

▣ Test Plots(802.11ac(VHT80))

Note:

In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 42)	UNII 2A (Ch. 58)
	
UNII 2C (Ch. 122)	**UNII 3 (Ch. 155)**
	

10.6 FREQUENCY STABILITY.

10.6.1 80 MHz BW

[Ant.1]

Startup after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5210032.96	32.96
100%		-30	5210007.29	7.29
100%		-20	5210014.55	14.55
100%		-10	5210020.06	20.06
100%		0	5210025.06	25.06
100%		+10	5210030.84	30.84
100%		+30	5210036.85	36.85
100%		+40	5210044.84	44.84
100%		+50	5210058.97	58.97
Batt. Endpoint	3.4	+20	5210031.57	31.57

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5290033.72	33.72
100%		-30	5290005.38	5.38
100%		-20	5290013.59	13.59
100%		-10	5290019.32	19.32
100%		0	5290020.19	20.19
100%		+10	5290030.84	30.84
100%		+30	5290035.44	35.44
100%		+40	5290047.30	47.3
100%		+50	5290058.34	58.34
Batt. Endpoint	3.4	+20	5290035.94	35.94

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5530032.47	32.47
100%		-30	5530009.86	9.86
100%		-20	5530013.66	13.66
100%		-10	5530017.94	17.94
100%		0	5530025.52	25.52
100%		+10	5530030.04	30.04
100%		+30	5530037.24	37.24
100%		+40	5530046.53	46.53
100%		+50	5530059.06	59.06
Batt. Endpoint	3.4	+20	5530032.19	32.19

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5775034.60	34.60
100%		-30	5775008.44	8.44
100%		-20	5775015.72	15.72
100%		-10	5775020.70	20.7
100%		0	5775021.83	21.83
100%		+10	5775029.93	29.93
100%		+30	5775036.12	36.12
100%		+40	5775050.45	50.45
100%		+50	5775051.93	51.93
Batt. Endpoint	3.4	+20	5775030.57	30.57

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

2 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5210034.53	34.53
100%		-30	5210005.69	5.69
100%		-20	5210012.02	12.02
100%		-10	5210015.36	15.36
100%		0	5210023.76	23.76
100%		+10	5210029.52	29.52
100%		+30	5210036.89	36.89
100%		+40	5210043.32	43.32
100%		+50	5210056.96	56.96
Batt. Endpoint	3.4	+20	5210035.30	35.30

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5290035.32	35.32
100%		-30	5290008.63	8.63
100%		-20	5290014.15	14.15
100%		-10	5290017.51	17.51
100%		0	5290022.58	22.58
100%		+10	5290026.86	26.86
100%		+30	5290035.12	35.12
100%		+40	5290046.71	46.71
100%		+50	5290050.33	50.33
Batt. Endpoint	3.4	+20	5290035.30	35.3

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5530034.36	34.36
100%		-30	5530010.37	10.37
100%		-20	5530012.79	12.79
100%		-10	5530020.64	20.64
100%		0	5530021.48	21.48
100%		+10	5530027.05	27.05
100%		+30	5530040.82	40.82
100%		+40	5530042.04	42.04
100%		+50	5530054.09	54.09
Batt. Endpoint	3.4	+20	5530030.53	30.53

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5775032.97	32.97
100%		-30	5775010.61	10.61
100%		-20	5775013.63	13.63
100%		-10	5775018.30	18.3
100%		0	5775023.74	23.74
100%		+10	5775028.17	28.17
100%		+30	5775038.48	38.48
100%		+40	5775047.37	47.37
100%		+50	5775057.17	57.17
Batt. Endpoint	3.4	+20	5775030.80	30.8

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

5 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5210032.14	32.14
100%		-30	5210009.48	9.48
100%		-20	5210015.31	15.31
100%		-10	5210018.42	18.42
100%		0	5210021.94	21.94
100%		+10	5210027.91	27.91
100%		+30	5210037.06	37.06
100%		+40	5210047.79	47.79
100%		+50	5210056.81	56.81
Batt. Endpoint	3.4	+20	5210031.35	31.35

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5290034.04	34.04
100%		-30	5290008.95	8.95
100%		-20	5290011.81	11.81
100%		-10	5290016.73	16.73
100%		0	5290022.53	22.53
100%		+10	5290028.32	28.32
100%		+30	5290036.39	36.39
100%		+40	5290045.97	45.97
100%		+50	5290054.04	54.04
Batt. Endpoint	3.4	+20	5290034.12	34.12

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5530034.90	34.90
100%		-30	5530007.66	7.66
100%		-20	5530014.08	14.08
100%		-10	5530019.31	19.31
100%		0	5530022.33	22.33
100%		+10	5530025.72	25.72
100%		+30	5530040.56	40.56
100%		+40	5530046.70	46.7
100%		+50	5530052.70	52.70
Batt. Endpoint	3.4	+20	5530031.50	31.5

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5775030.71	30.71
100%		-30	5775010.33	10.33
100%		-20	5775013.89	13.89
100%		-10	5775016.57	16.57
100%		0	5775022.84	22.84
100%		+10	5775027.24	27.24
100%		+30	5775037.56	37.56
100%		+40	5775050.84	50.84
100%		+50	5775051.88	51.88
Batt. Endpoint	3.4	+20	5775032.51	32.51

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

10 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5210034.79	34.79
100%		-30	5210007.38	7.38
100%		-20	5210010.44	10.44
100%		-10	5210015.53	15.53
100%		0	5210022.20	22.20
100%		+10	5210030.48	30.48
100%		+30	5210036.73	36.73
100%		+40	5210045.91	45.91
100%		+50	5210052.24	52.24
Batt. Endpoint	3.4	+20	5210030.84	30.84

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5290032.23	32.23
100%		-30	5290008.29	8.29
100%		-20	5290015.89	15.89
100%		-10	5290015.83	15.83
100%		0	5290025.72	25.72
100%		+10	5290028.97	28.97
100%		+30	5290035.47	35.47
100%		+40	5290044.63	44.63
100%		+50	5290053.13	53.13
Batt. Endpoint	3.4	+20	5290033.61	33.61

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5530035.76	35.76
100%		-30	5530007.90	7.90
100%		-20	5530010.16	10.16
100%		-10	5530019.51	19.51
100%		0	5530023.38	23.38
100%		+10	5530026.93	26.93
100%		+30	5530038.12	38.12
100%		+40	5530040.12	40.12
100%		+50	5530059.28	59.28
Batt. Endpoint	3.4	+20	5530031.14	31.14

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	4.2 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	4.2	+20(Ref)	5775031.10	31.10
100%		-30	5775008.61	8.61
100%		-20	5775012.35	12.35
100%		-10	5775015.30	15.30
100%		0	5775025.84	25.84
100%		+10	5775029.98	29.98
100%		+30	5775035.28	35.28
100%		+40	5775047.67	47.67
100%		+50	5775059.75	59.75
Batt. Endpoint	3.4	+20	5775034.34	34.34

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

10.7 STRADDLE CHANNEL

10.7.1 26 dB Bandwidth

[Ant.1]

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11a	UNII 2C	5720	144	5710.76	14.24
802.11n(HT20)				5710.24	14.76
802.11ac(VHT20)				5710.08	14.92
802.11a	UNII 3	5720	144	5729.24	4.24
802.11n(HT20)				5729.64	4.64
802.11ac(VHT20)				5729.84	4.84

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11n(HT40)	UNII 2C	5710	142	5690.48	34.52
802.11ac(VHT40)				5690.40	34.60
802.11n(HT40)	UNII 3	5710	142	5729.60	4.60
802.11ac(VHT40)				5729.52	4.52

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11ac(VHT80)	UNII 2C	5690	138	5649.52	75.48
	UNII 3	5690	138	5730.16	5.16

Note:

[UNII 2C] 26 dB Bandwidth = 5 725 MHz - Measured Frequency[MHz]

[UNII 3C] 26 dB Bandwidth = Measured Frequency[MHz] – 5 725 MHz

[Ant.2]

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11a	UNII 2C	5720	144	5710.72	14.28
802.11n(HT20)				5710.36	14.64
802.11ac(VHT20)				5710.12	14.88
802.11a	UNII 3	5720	144	5729.28	4.28
802.11n(HT20)				5729.64	4.64
802.11ac(VHT20)				5729.72	4.72

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11n(HT40)	UNII 2C	5710	142	5690.48	34.52
802.11ac(VHT40)				5690.32	34.68
802.11n(HT40)	UNII 3	5710	142	5729.44	4.44
802.11ac(VHT40)				5729.52	4.52

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11ac(VHT80)	UNII 2C	5690	138	5650.16	74.84
	UNII 3	5690	138	5730.00	5.00

Note:

[UNII 2C] 26 dB Bandwidth = 5 725 MHz **-** Measured Frequency[MHz]

[UNII 3C] 26 dB Bandwidth = Measured Frequency[MHz] – 5 725 MHz

[Ant.1]

▣ Test Plots (26 dB Bandwidth)

802.11a UNII Band	802.11n(HT20) UNII Band
	

802.11ac(VHT20) UNII Band


▣ Test Plots (26 dB Bandwidth)

802.11n(HT40) UNII Band	802.11ac(VHT40) UNII Band
	

802.11ac(VHT80) UNII Band


[Ant.2]

▣ Test Plots (26 dB Bandwidth)

802.11a UNII Band	802.11n(HT20) UNII Band
	
802.11ac(VHT20) UNII Band	
	

▣ Test Plots (26 dB Bandwidth)

802.11n(HT40) UNII Band	802.11ac(VHT40) UNII Band
	

802.11ac(VHT80) UNII Band


10.7.2 6 dB Bandwidth

[Ant.1]

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11a	UNII 3	5720	144	5727.92	2.92	> 0.5
802.11n(HT20)				5727.56	2.56	> 0.5
802.11ac(VHT20)				5728.44	3.44	> 0.5

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11n(HT40)	UNII 3	5710	142	5727.60	2.60	> 0.5
802.11ac(VHT40)				5727.60	2.60	> 0.5

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11ac(VHT80)	UNII 3	5690	138	5727.60	2.60	> 0.5

Note:

6 dB Bandwidth = Measured Frequency[MHz] – 5 725MHz

[Ant.2]

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11a	UNII 3	5720	144	5728.16	3.16	> 0.5
802.11n(HT20)				5728.44	3.44	> 0.5
802.11ac(VHT20)				5728.40	3.40	> 0.5

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11n(HT40)	UNII 3	5710	142	5727.60	2.60	> 0.5
802.11ac(VHT40)				5727.60	2.60	> 0.5

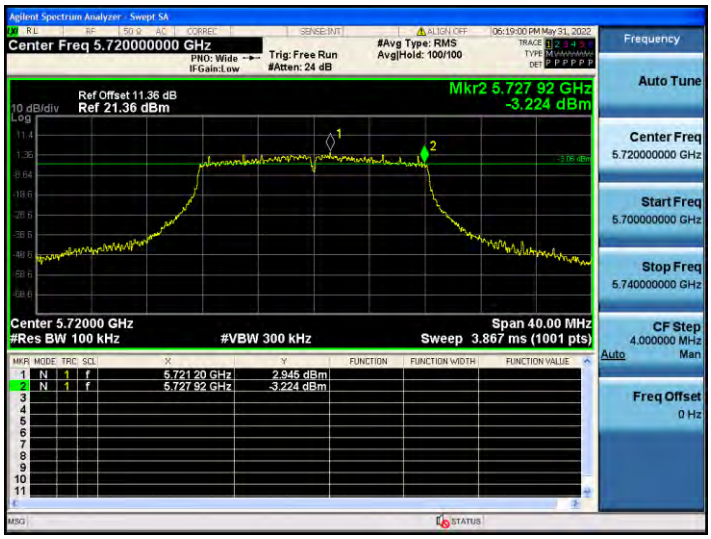
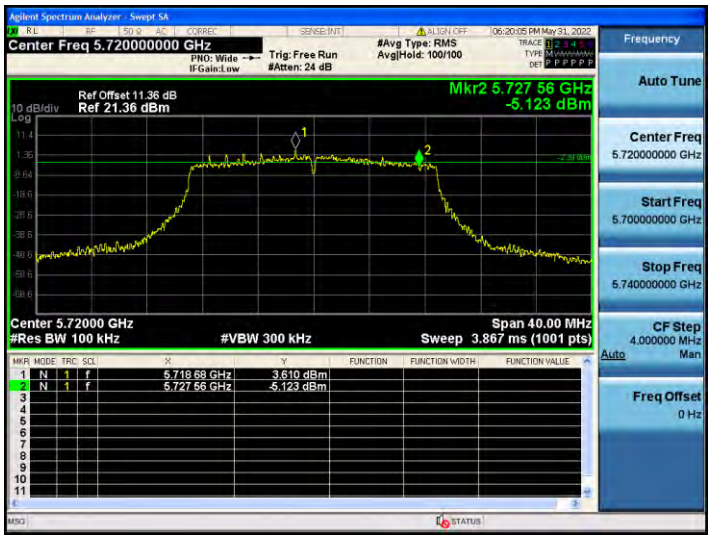
Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11ac(VHT80)	UNII 3	5690	138	5727.60	2.60	> 0.5

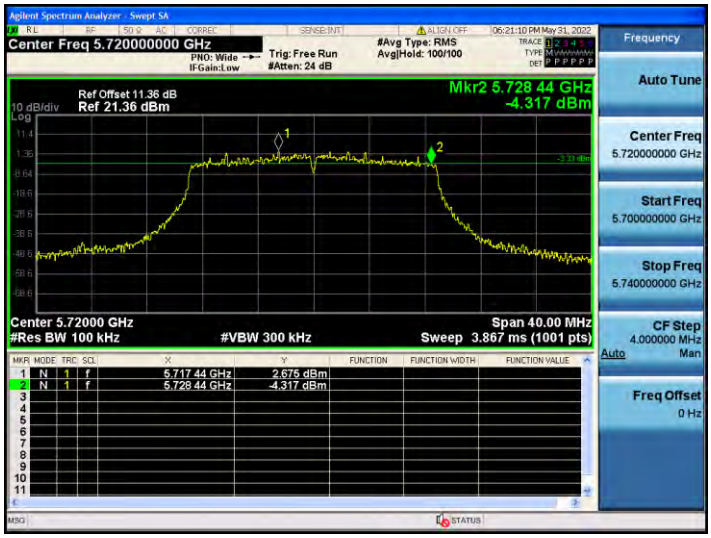
Note:

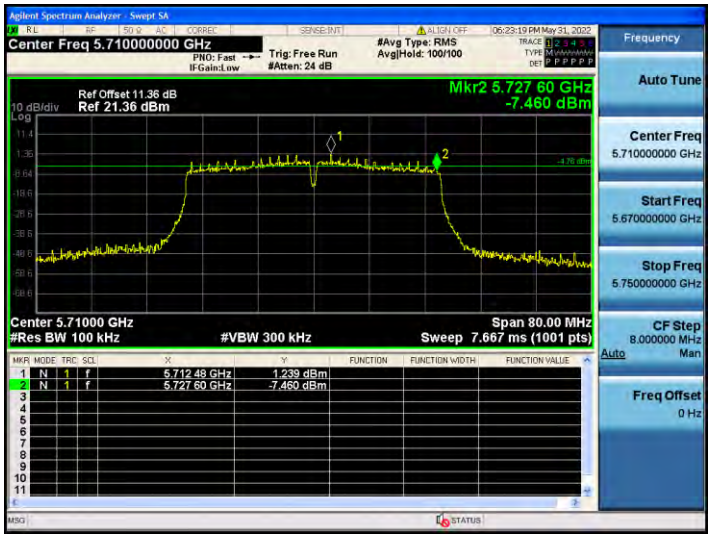
6 dB Bandwidth = Measured Frequency[MHz] – 5725MHz

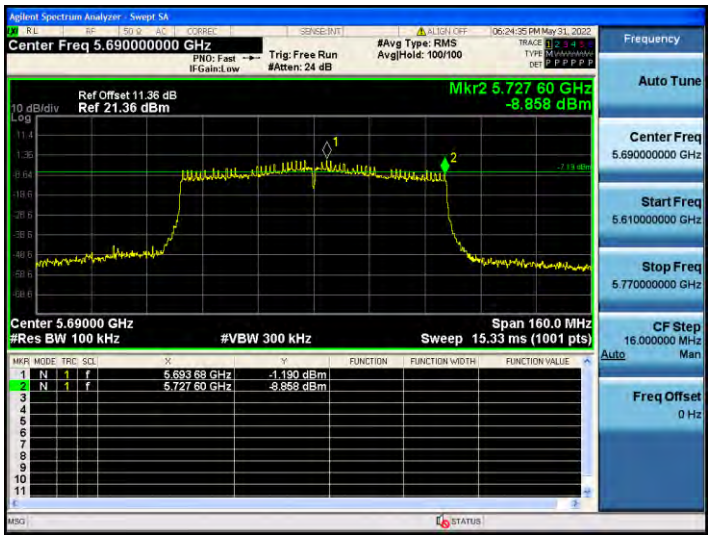
[Ant.1]

▣ Test Plots(UNII 3 Band 6 dB Bandwidth)

802.11a CH.144	802.11n_HT20 CH.144
	

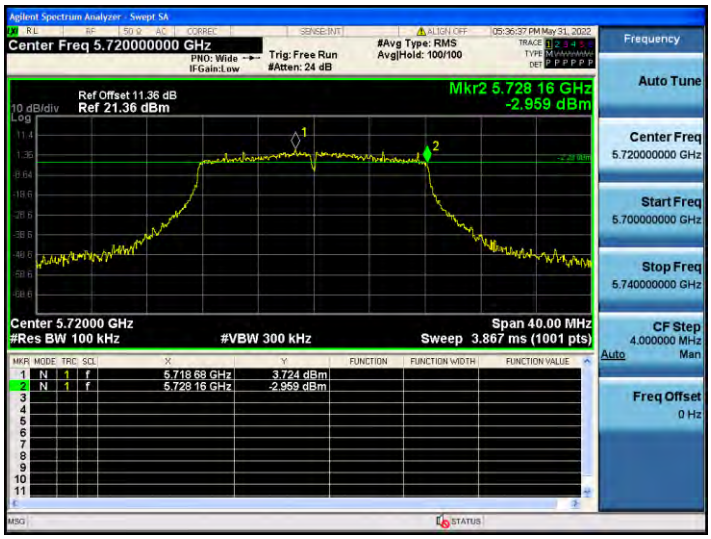
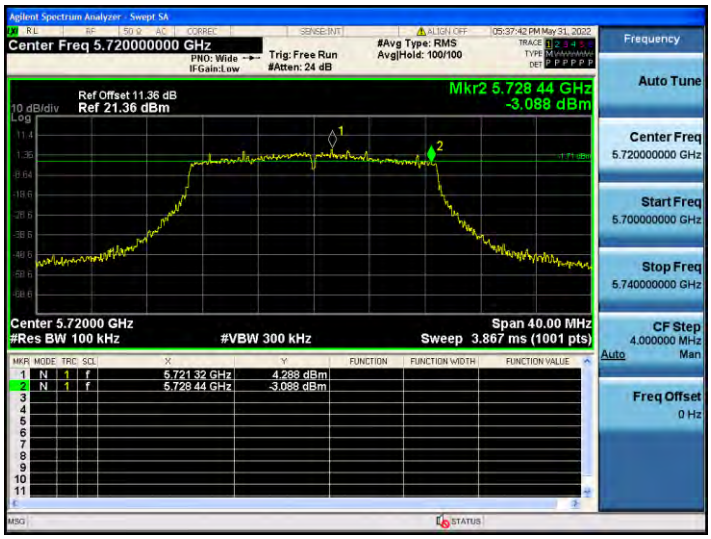
802.11ac_VHT20 CH.144


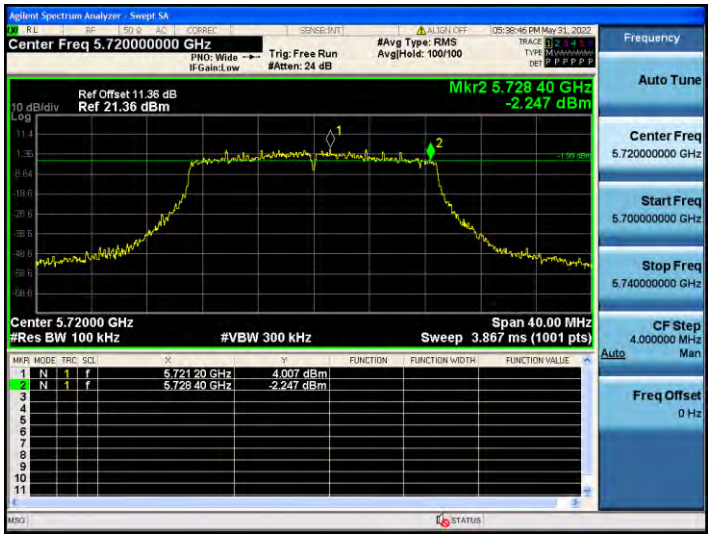
802.11n_HT40 CH.142	802.11ac_VHT40 CH.142
	

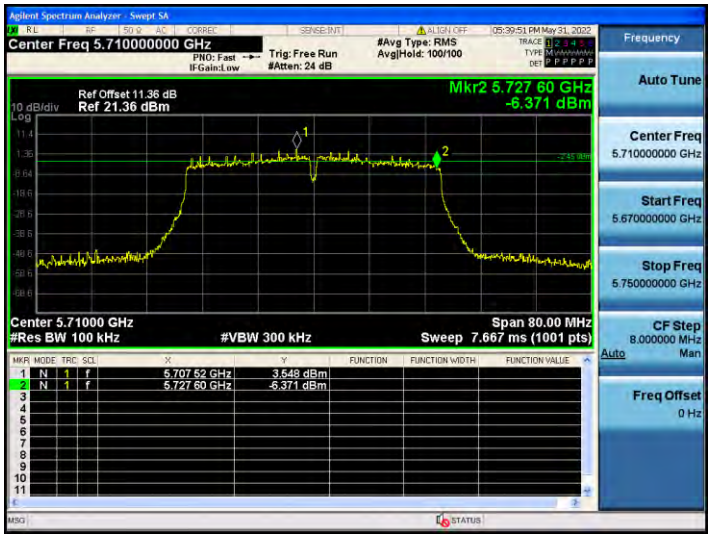
802.11ac_VHT80 CH.138


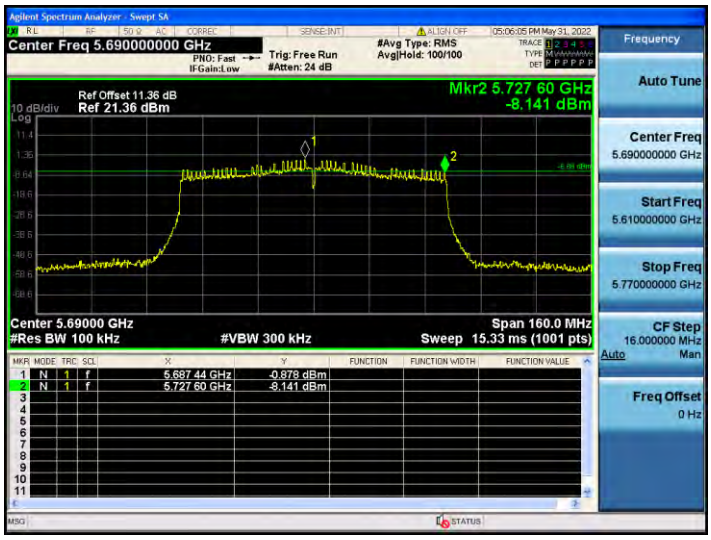
[Ant.2]

▣ Test Plots(UNII 3 Band 6 dB Bandwidth)

802.11a CH.144	802.11n_HT20 CH.144
	

802.11ac_VHT20 CH.144


802.11n_HT40 CH.142	802.11ac_VHT40 CH.142
	

802.11ac_VHT80 CH.138


10.7.3 Output Power

[Ant.1]

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11a	5720 (UNII 2C Band)	144	13.51	0.292	13.81	22.54	6 Mbps
802.11n(HT20)			13.23	0.339	13.57	22.69	MCS0
802.11ac(VHT20)			13.18	0.322	13.50	22.74	MCS0
802.11a	5720 (UNII 3 Band)	144	5.64	0.292	5.93	30.00	6 Mbps
802.11n(HT20)			5.90	0.339	6.24	30.00	MCS0
802.11ac(VHT20)			5.94	0.322	6.27	30.00	MCS0

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11n(HT40)	5710 (UNII 2C Band)	142	14.31	0.624	14.93	23.98	MCS0
802.11ac(VHT40)			13.33	0.654	13.98	23.98	MCS0
802.11n(HT40)	5710 (UNII 3 Band)	142	2.10	0.624	2.73	30.00	MCS0
802.11ac(VHT40)			0.94	0.654	1.59	30.00	MCS0

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11ac(VHT80)	5690 (UNII 2C Band)	138	12.56	1.178	13.74	23.98	MCS0
	5690 (UNII 3 Band)	138	-4.18	1.178	-3.00	30.00	MCS0

[Ant.2]

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11a	5720 (UNII 2C Band)	144	14.99	0.292	15.28	22.55	6 Mbps
802.11n(HT20)			14.63	0.339	14.97	22.66	MCS0
802.11ac(VHT20)			14.61	0.322	14.93	22.73	MCS0
802.11a	5720 (UNII 3 Band)	144	7.03	0.292	7.32	30.00	6 Mbps
802.11n(HT20)			7.29	0.339	7.63	30.00	MCS0
802.11ac(VHT20)			7.33	0.322	7.65	30.00	MCS0

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11n(HT40)	5710 (UNII 2C Band)	142	15.52	0.624	16.15	23.98	MCS0
802.11ac(VHT40)			14.62	0.654	15.27	23.98	MCS0
802.11n(HT40)	5710 (UNII 3 Band)	142	3.20	0.624	3.83	30.00	MCS0
802.11ac(VHT40)			2.33	0.654	2.99	30.00	MCS0

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11ac(VHT80)	5690 (UNII 2C Band)	138	12.78	1.178	13.95	23.98	MCS0
	5690 (UNII 3 Band)	138	-3.86	1.178	-2.68	30.00	MCS0